MODEL 600B
DIGITAL TIME
INTERVAL GENERATOR

SERIAL NO.

(A)

SYSTRON DONNER

DC 569808
P.O 76-189602

# INSTRUCTION MANUAL

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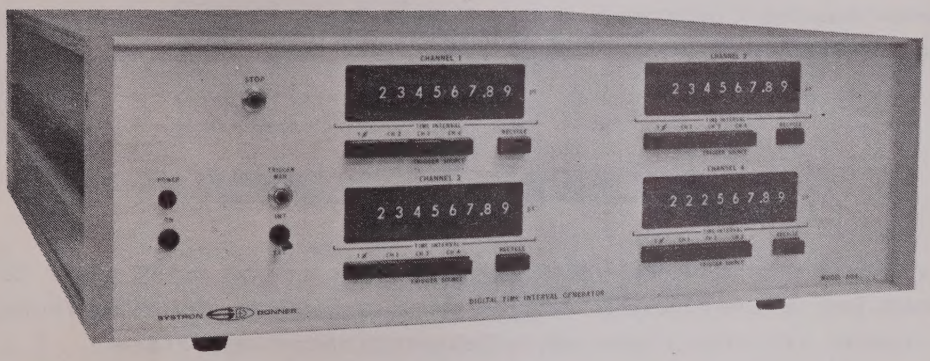


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SYSTRON DONNER CORPORATION

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SYSTRON DONNER
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Whenever a Systron-Donner instrument requires service, the nearest Systron-Donner representative should be contacted; all representatives will provide immediate service or arrange factory returns when necessary.

Please specify both model and serial number in all correspondence concerning Systron-Donner instruments. Address all inquiries on operation or applications to your nearest sales representative; or, Sales Manager, Concord Instrument Division, Systron-Donner Corporation, 10 Systron Drive, Concord, California 94518.

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# CHAPTER 1
# GENERAL INFORMATION

## 1.1 INTRODUCTION

The series Model 600B Digital Time Interval Generator is an extremely versatile timed pulse generator. Accurate time intervals at 10 nanosecond resolution may be generated from random or repetitive events. Two or four channel availability provides a highly flexible timing system for time delay, repetitive period or time mark. A choice of internal or external trigger, and internal or external time base contributes to the utility of the instrument. The last figure in the model number is the number of channels in the instrument.

## 1.2 SPECIFICATIONS

Table 1.1 lists the specifications for the standard Model 600B. Available options are listed in Table 1.2.

TABLE 1.1 SPECIFICATIONS

| | |
|---|---|
| Recycle Modes: | |
| Triggered: | 0.02 to 999,999.99 μs. |
| Repetitive: | 0.10 to 999,999.90 μs. |
| Resolution: | 10 ns, internal clock. |
| Accuracy: | ±0.001% of setting ±5 ns. |
| Jitter: | Less than 2 ns, TØ sync to any output or between any two outputs. |
| Indeterminancy: | 10 ns, external trigger to any output. |
| Timed Output: | > +2V into 50 Ω; approximately 5 ns rise time; approximately 50 ns wide. Occurs at end of preset time interval. |
| TØ Synchronized Output: | > +2V into 50 Ω; approximately 5 ns rise time; approximately 50 ns wide. Occurs at beginning of timed interval. Approximately 10 ns indeterminancy referred to external trigger. |
| Gate Output: | > +2V into 50 Ω; approximately 5ns rise/fall time; width determined by interval setting. Occurs between TØ and timed output pulse. |

TABLE 1.1 SPECIFICATIONS (Cont'd)

| | |
|---|---|
| External Trigger: | > +2V; > 20 ns wide; dc to 10 MHz, any waveshape, with edge speed exceeding 5 V/ms. |
| External Clock: | > +2V; > 20 ns wide; 10 MHz frequency. |
| Power: | 115/230V, 50/60 Hz, 150 Watts. Fuse; 115V, 1.5A Slo-Blo; 220V, .75A Slo-Blo. |
| Dimensions: | 13.3 X 42.6 X 48.9 cm (5-1/4" H X 16-3/4" W X 19-1/4" D) |
| Weight: | 13.6 kg (30 lbs) net; 15.9 kg (35 lbs) shipping. |

## 1.3 OPTIONS

Table 1.2 contains a short description of all standard options available for the instrument.

TABLE 1.2 OPTIONS

| Option | Description |
|---|---|
| 02 | Triggered time base reduces indeterminancy with respect to external trigger. |
| 05 | Extends delay range to 9,999,999.99 µs. |
| 10 | Serial remote programming, positive true. |
| 11 | Serial remote programming, ground true. |
| 12 | Parallel remote programming, ground true. |
| 13 | Removes manual control of time parameters from front panel. |
| 14 | Parallel remote programming, positive true. |
| 21 | Provides high level approximately 80 V, TØ sync. and timed output pulses. Reduces recycle rate and increases rise time. |

TABLE 1.2 OPTIONS (Cont'd)

| Option | Description |
|---|---|
| 91 | Provides ignition type lock-out which grounds all outputs and can be enabled only with the proper key. |
| 92 | Moves the output connectors from the front panel to the rear panel. |
| Rack Mounting | |
| Type 1011 | Provides rack mounting for the instrument. |
| Type 1012 | Provides rack mounting using chassis slide mounts. |

## 1.4 LOGIC SYMBOLS AND NOTATIONS

Since most of the integrated circuit modules used in this instrument are TTL compatible, most signal levels are 0.0V to 0.8V LOW (L) and +2.4V to 5.0V HIGH (H) (see Figure 1.1). Symbols used conform to MIL STD 806B.

Integrated circuits using MECL levels are usually varied from -1.75 Vdc low to -0.9 Vdc high. The tri-state logic elements used as turn-on, turn-off gates will pass either a low signal or high signal without inversion when the gate is turned on.

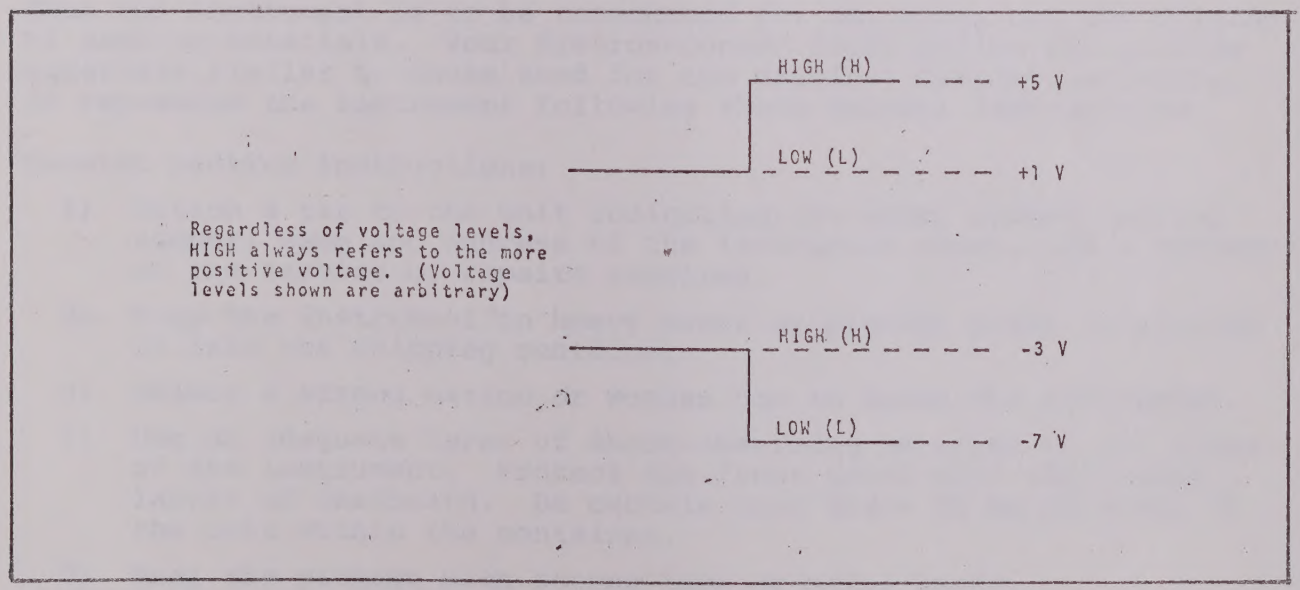



FIGURE 1.1 DEFINITION OF LOGIC LEVELS

# CHAPTER 2
# INSTALLATION

## 2.1 INTRODUCTION

The SD series Model 600B Digital Time Interval Generator is shipped in an operational condition and is essentially ready for use as received. This chapter outlines the procedures for initial inspection and installation of the instrument. Instructions for reshipment are also included should the unit be returned to Systron-Donner Corporation for service or repair.

## 2.2 RECEIVING INSPECTION

Prior to accepting the counter from the shipper, inspect the condition of the shipping container for any indication of freight damage. Any sign of such damage must be noted by the shipper and receiver, and should be reported to the insurance investigator.

Immediately following removal of the instrument from the shipping carton, inspect for possible physical damage incurred during shipment. Check surfaces for scratches or dents and note condition of controls, and connectors. Should any damage be noted, notify your nearest Systron-Donner representative---DO NOT USE THE COUNTER UNTIL INSTRUCTED TO DO SO BY THE REPRESENTATIVE.

## 2.3 RESHIPMENT

When the instrument is to be repackaged for shipment, use the original packing materials. Your Systron-Donner field office can provide materials similar to those used for the original factory packaging, or repackage the instrument following these general instructions.

General packing instructions:

1) Attach a tag to the unit indicating the model number, serial number, name and address of the instrument owner, and a summary of the service or repairs required.
2) Wrap the instrument in heavy paper or plastic prior to placing it into the shipping container.
3) Select a strong carton or wooden box to house the instrument.
4) Use an adequate layer of shock-absorbing material on all sides of the instrument. Protect the front panel with additional layers of cardboard. Be certain that there is no movement of the unit within the container.
5) Seal the package with strong tape or metal bands.
6) Mark the shipping container "FRAGILE-DELICATE INSTRUMENT" to ensure careful handling.

7) Be certain that all correspondence refers to full instrument nomenclature (model and serial number).

## 2.4 POWER REQUIREMENTS

The instrument operates from either 115 or 230 Vac. Prior to connecting the power cord, ensure that the correct line voltage is available, the correct fuse is installed, and the slide switch on the rear panel is set to the available line voltage.

## 2.5 CIRCUIT CHECK

An operational checkout of all modes of operation is contained in Chapter 5, Section 5.4.

# CHAPTER 3
# OPERATION

## 3.1 INTRODUCTION

This chapter contains a description of each operating mode, step-by-step operating procedure, and a description of all controls, connectors, and indicators on the front and rear panels of the instrument.

## 3.2 OPERATING MODES

There are two operating modes available for each channel, repetitive and triggered. The triggered mode may utilize an external trigger, internal trigger (manual pushbutton), or the trigger output from any other channel. In the triggered mode, when the count is completed, the channel resets until it is again triggered. The repetitive mode continuously recycles the channel through the count as long as the RECYCLE mode is selected. There is no GATE output in this mode of operation.

## 3.3 FRONT PANEL FUNCTIONS

The following table describes the function of the controls, connectors, and indicators on the front panel of the instrument. The Model 604B front panel is described.

TABLE 3.1 FRONT PANEL FUNCTION

| Index | Name | Function |
|---|---|---|
| 1 | TRIGGER | |
| | MAN | Momentary pushbutton switch provides for manually triggering the instrument. |
| | INT/EXT | Toggle switch selects either the internal trigger or a trigger from an external source through the BNC connector. |
| 2 | TØ OUT | BNC connector provides output for the TØ pulse. |
| 3 | POWER | Toggle switch selects power ON/OFF. LED indicator lights when power is ON. |

TABLE 3.1 FRONT PANEL FUNCTION (Cont'd)

| Index | Name | Function |
|---|---|---|
| 4 | STOP | Momentary pushbutton switch resets the timed interval gate and inhibits its counting. Will not affect a channel operating in the repetitive mode. |
| 5 | CHANNEL 1 | |
| | TIME INTERVAL | Thumbwheel switches select the time interval to be counted by Channel 1. |
| | TRIGGER SOURCE | Interlocked pushbutton switches select the trigger source, TØ, CH2, CH3, CH4, or RECYCLE. |
| | PULSE OUT | BNC connector provides output of the Channel 1 timed interval pulse. |
| | GATE OUT | BNC connector provides output of the Channel 1 timed interval gate when in triggered mode. |
| 6 | CHANNEL 2 | |
| | TIME INTERVAL | Thumbwheel switches select the time interval to be counted by Channel 2. |
| | TRIGGER SOURCE | Interlocked pushbutton switches select the trigger source, TØ, CH1, CH3, CH4, or RECYCLE. |
| | PULSE OUT | BNC connector provides output of the Channel 2 timed interval pulse. |
| | GATE OUT | BNC connector provides output of the Channel 2 timed interval gate when in triggered mode. |
| 7 | CHANNEL 3 | |
| | TIME INTERVAL | Thumbwheel switches select the time interval to be counted by Channel 3. |
| | TRIGGER SOURCE | Interlocked pushbutton switches select the trigger source, TØ, CH1, CH2, CH4, or RECYCLE. |
| | PULSE OUT | BNC connector provides output of the Channel 3 timed interval pulse. |
| | GATE OUT | BNC connector provides output of the Channel 3 timed interval gate when in triggered mode. |
| 8 | CHANNEL 4 | |
| | TIME INTERVAL | Thumbwheel switches select the time |

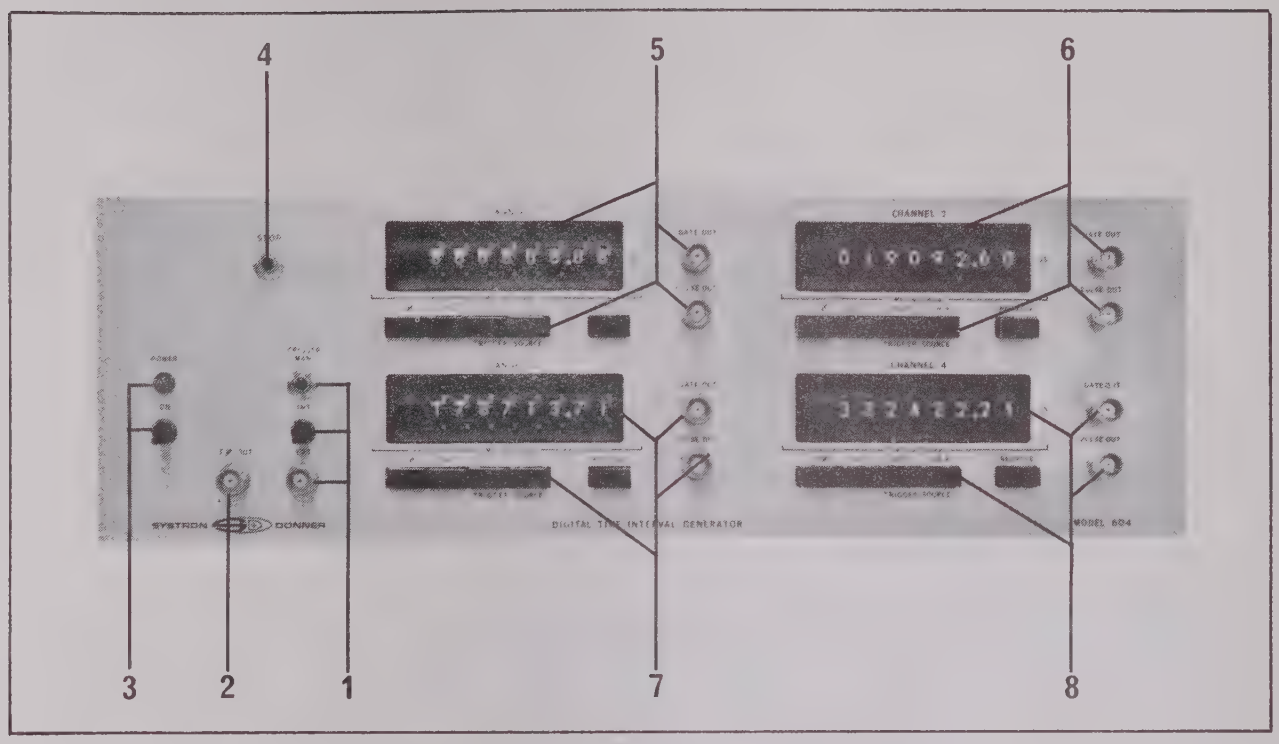



FIGURE 3.1 FRONT PANEL FUNCTIONS

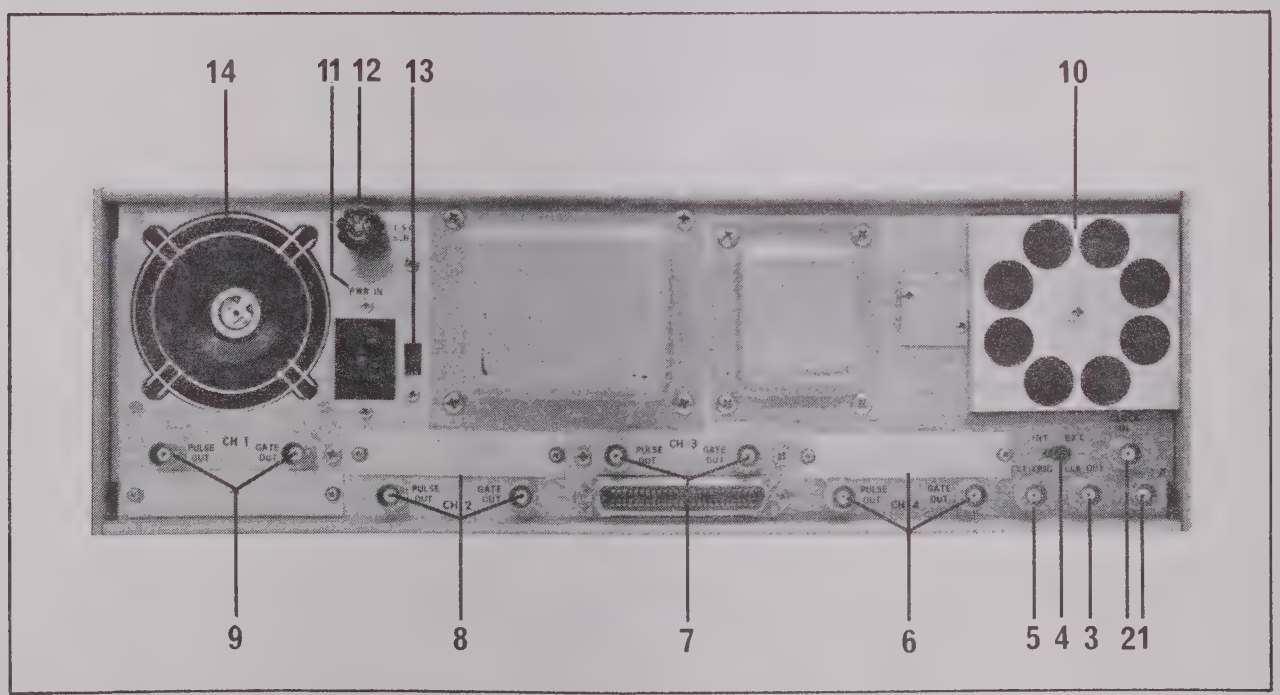



FIGURE 32. REAR PANEL FUNCTIONS

TABLE 3.1 FRONT PANEL FUNCTION (Cont'd)

| Index | Name | Function |
|---|---|---|
| 8 (Cont'd) | | interval to be counted by Channel 4. |
| | TRIGGER SOURCE | Interlocked pushbutton switches select the trigger source, TØ, CH1, CH2, CH3, or RECYCLE. |
| | PULSE OUT | BNC connector provides output of the Channel 4 timed interval pulse. |
| | GATE OUT | BNC connector provides output of the Channel 4 timed interval gate when in triggered mode. |

## 3.4 REAR PANEL FUNCTIONS

The following table describes the functions of the controls and connectors on the rear panel of the instrument. The panel is standard for all instruments in the series and cover plates are installed when an item is not used on that particular model. Location of the index numbers is shown on Figure 1.

TABLE 3.2 REAR PANEL FUNCTION

| Index | Name | Function |
|---|---|---|
| 1 | TØ (Option) | BNC connector provides synchronous time zero on the rear panel. |
| 2 | CLOCK IN | BNC connector provides input for operating the instrument using an external 10 MHz clock signal. |
| 3 | CLK OUT | BNC connector provides 10 MHz clock output. |
| 4 | INT/EXT | Slide switch selects either the internal time base or an external time base connected to the CLOCK IN BNC connector. |
| 5 | EXT TRIG (Option) | BNC connector provides input for operating the instrument using an external trigger. |
| 6 | CH 4 (Option) | 50 pin connector provides for programming Channel 4 from a remote location. |
| | GATE OUT | BNC connector provides the Channel 4 GATE OUT signal in the rear panel. |

TABLE 3.2 REAR PANEL FUNCTION (Cont'd)

| Index | Name | Function |
|---|---|---|
| 6 (Cont'd) | PULSE OUT | BNC connector provides the Channel 4 timed interval output on the rear panel. |
| 7 | CH 3 (Option) | 50 pin connector provides for programming Channel 3 from a remote location. |
| | GATE OUT | BNC connector provides the Channel 3 GATE OUT signal on the rear panel. |
| | PULSE OUT | BNC connector provides the Channel 3 timed interval signal on the rear panel. |
| 8 | CH 2 (Option) | 50 pin connector provides for programming Channel 2 from a remote location. When remote serial programming is installed, the Channel 2 connector is used for programming all channels. |
| | GATE OUT | BNC connector provides the Channel 2 GATE OUT signal on the rear panel. |
| | PULSE OUT | BNC connector provides the Channel 2 timed interval signal on the rear panel. |
| 9 | CH 1 (Option) | 50 pin connector provides for programming Channel 1 from a remote location. |
| | GATE OUT | BNC connector provides Channel 1 GATE OUT signal on rear panel. |
| | PULSE OUT | BNC connector provides Channel 1 timed interval output on rear panel. |
| 10 | Air Intake | Provides filtered, outside air for cooling internal components. |
| 11 | PWR IN | AC connector provides socket to plug in line power. Also contains filter circuit FL1. |
| 12 | Fuseholder | 1.5A fuse for 115 Vac, .75A fuse for 230 Vac. |
| 13 | 115/230 | Slide switch provides for selection of either 115V or 230 Vac input. |
| 14 | Fan Exhaust | Provides air outlet for blower. |

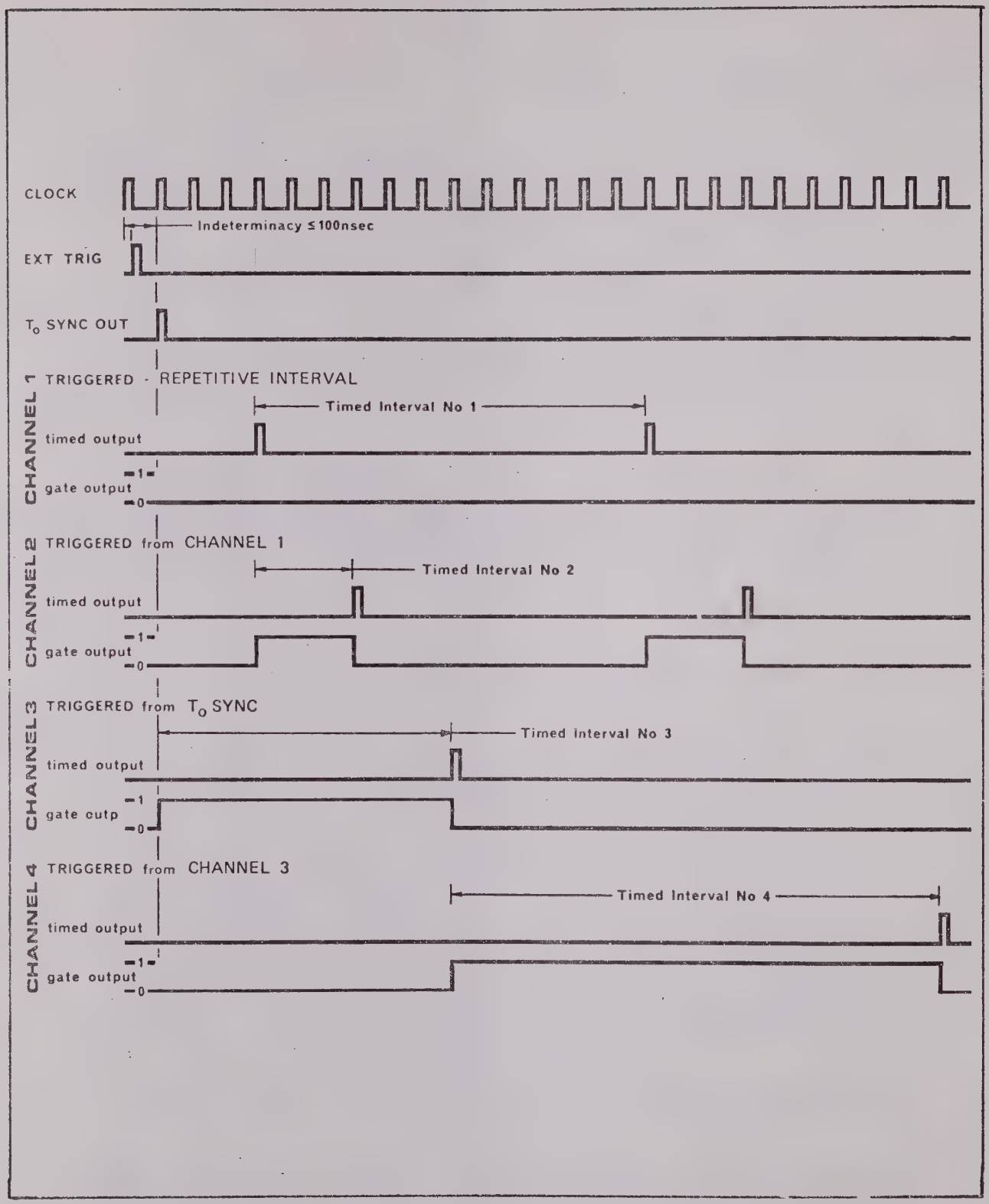



FIGURE 3.3 MULTIMODE OPERATION OUTPUTS

## 3.5 OPERATION

Operation of the instrument is the same in all channels. The only difference is the trigger selection available for any given channel. The instrument can be triggered by either an internal or external trigger. Each channel can then be started by the trigger or by a trigger pulse from any other channel, or operate in the repetitive mode. To operate the instrument, use the following procedure:

1) Position power switch to ON. Then, in each channel, position the thumbwheel switches for the desired delay time in microseconds, observing the decimal point.
2) Determine the trigger to be used; external or internal. Position the trigger switch to the desired position.
3) If an external trigger is selected, connect the external trigger to the EXT BNC connector.
4) If an external time base frequency is to be used, connect the 10 MHz time base frequency to the CLOCK IN BNC connector on the rear panel.
5) In multimode operation, select the trigger to be used by each channel; TØ trigger from another channel, or RECYCLE.

### 3.5.1 Multimode Operation

Figure 3.3 shows an example of the timing and output of a Model 604B in multimode operation. Channel 1 is shown in the repetitive interval mode, RECYCLE, producing a precision repetition interval which is independent of the external trigger. Channel 2, triggered from Channel 1, is producing a time delay in respect to Channel 1. Channel 3 is producing an output from an external trigger and Channel 4 is producing a time delay with respect to Channel 3.

# CHAPTER 4
# FUNCTIONAL DESCRIPTION

## 4.1 INTRODUCTION

This chapter contains a functional description at the block diagram level and an individual circuit description for the power supply and for each of the A numbered assemblies. Circuit descriptions of the standard options are contained in Chapter 8. This manual may also contain revised or updated information reflecting certain changes in production requirements. This supplemental information will be located in Chapter 9; or, in some cases, may be added to the information in this chapter.

## 4.2 PRINCIPLES OF OPERATION

The Model 604B is an integrated circuit time interval generator which generates a timed, repetitive pulse, or a timed pulse from a repetitive or random trigger. Individual channels produce a pulse which can be varied from 0.02 to 999999.99 μs, referred to the TØ pulse. Channels may be cascaded to produce a timed output at up to 4 seconds with a resolution of 10 ns.

Figure 4.1 is a simplified functional block diagram of the instrument. The system consists of panel controls, time base, oscillator reference, time selection, decade counters, output buffers, and power supply.

Time selection is made by setting eight thumbwheel switches on the front panel. The 10 MHz oscillator frequency is multiplied to 100 MHz to serve as the system clock. The strobe gate developes two pulses. The longer one goes to the thumbwheel switches to release count entry to the storage register. The shorter strobe pulse enables the storage register to accept the count entry from the correct thumbwheel switch. This pulse must fall within the time envelope of the longer pulse.

The TØ pulse from the triggered gate may be developed from the internal or external trigger. The channel start pulse may be the TØ pulse or the channel trigger pulse from any other channel. The channel start pulse sets the count gate so that the 100 MHz (10 ns) pulses may be counted by the decade counters. When the selected number of pulses have been accumulated, the gate is closed until another trigger pulse is applied. In the repetitive mode, RECYCLE, the count gate is disabled and the decade counters continuously recycle through the preset count. There is no GATE output in this mode. The output buffers isolate and invert the output signals.

## 4.3 CIRCUIT DESCRIPTIONS

The following descriptions, of the standard A numbered assemblies and the power supply, may assist the technician in understanding the circuitry involved. A short description of the thumbwheel switch operation is also included.

### 4.3.1 Time Base Expander, A4, Schematic #7-05371401

The output of the 10 MHz oscillator circuit is applied as a positive square wave to the input of the time base multiplier. Gates U6-3, U5-3, and U6-11 convert the square wave to a negative going pulse of approximately 2.5 ns at a 10 MHz rate. U5 provides the required time delay. These pulses are applied through Q2 to the 100 MHz tank circuit.

One output of amplifier U4 is applied to the trigger gate in the Control Assembly. The other output goes through the output gate as the clock signal to the individual channels. Provision is made for outputs to and from the triggered time base when Option 02 is installed. Output gate logic provides blocking of the triggered time base output when a channel is in the recycle mode. Input to U5 is held at ground when Option 02 is installed.

### 4.3.2 Control Assembly, A16, Schematic #7-05371201

The Control Assembly is comprised of three major circuits; time base, strobe circuit, and trigger circuit.

The time base circuit includes the 10 MHz oscillator, internal/external selection gate and output to the time base expander, the output buffers, and the strobe circuit. The 10 MHz oscillator is basically of the Colpitts type with a 10 MHz crystal as an integral part of the frequency determining network. Frequency is controlled by capacitors, C1, C2, and C3, with associated circuitry. Gate U1-8 provides for using the internal oscillator frequency or an external frequency as the time base. When the INT/EXT switch is in the INT position, output is through U1-13 to U1-8. In the EXT position U1-10 is enabled and external frequency through Schmitt trigger, U12-8, is utilized as the time base.

The strobe circuit is comprised of U3, U4, U5, U13, U14, U15, U16, and U17. Provision is made for remote parallel and remote serial inputs. U3 and U4 are decade counters and U5 is a four-to-ten line converter. As each output line of U5 becomes active, a pulse is applied through strobe gates U13-3, U14, or U16 to strobe the applicable thumbwheel switch and transfer the value to the input of the storage register in the channel assembly. During the pulse period from U5, the output of U3 strobes U13-6, U15, and U17. The pulse length from U3 is slightly less than half of the pulse length from U5. The strobe pulse is then applied to the appropriate storage register in the

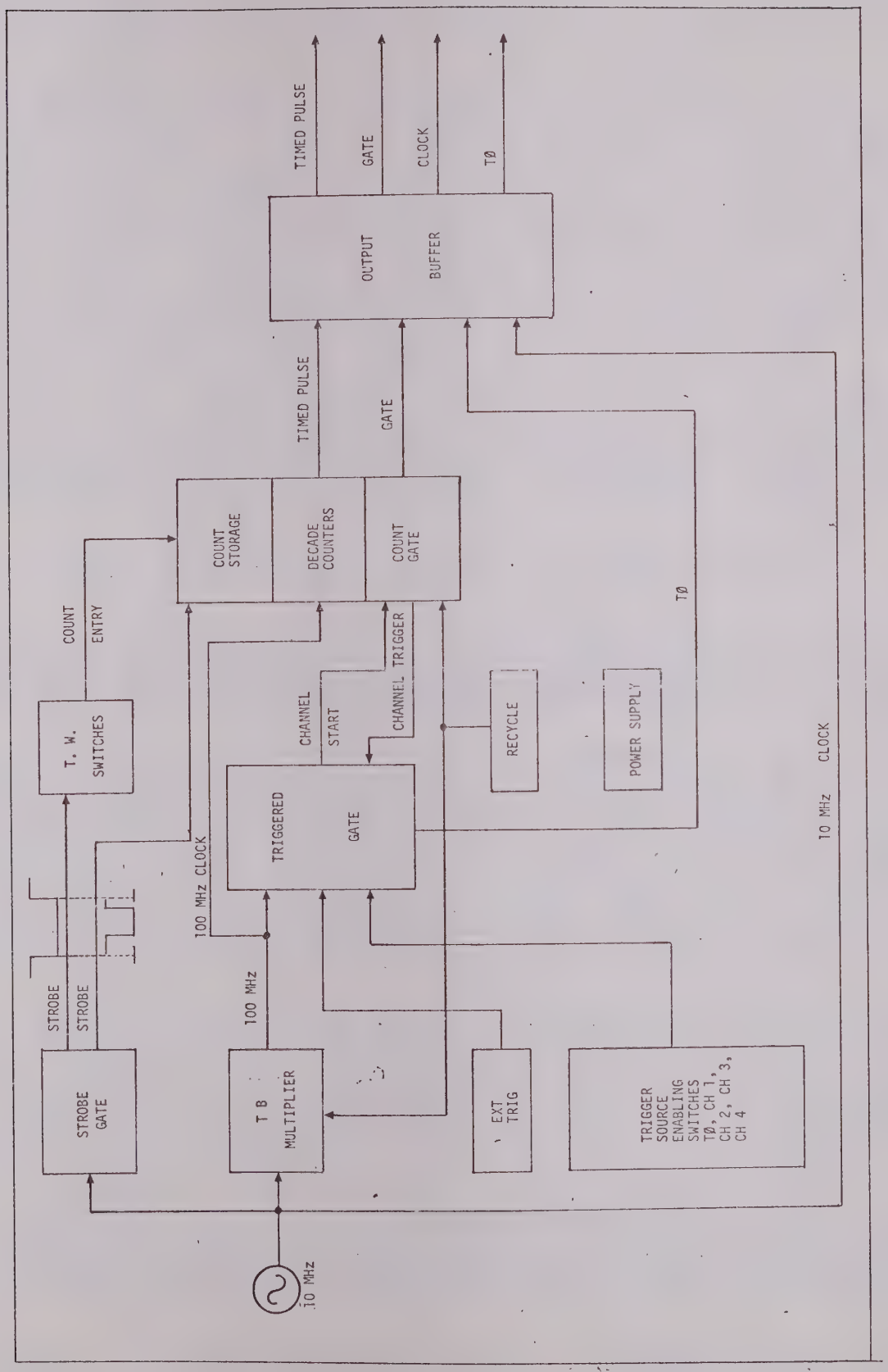



FIGURE 4.1 FUNCTIONAL BLOCK DIAGRAM

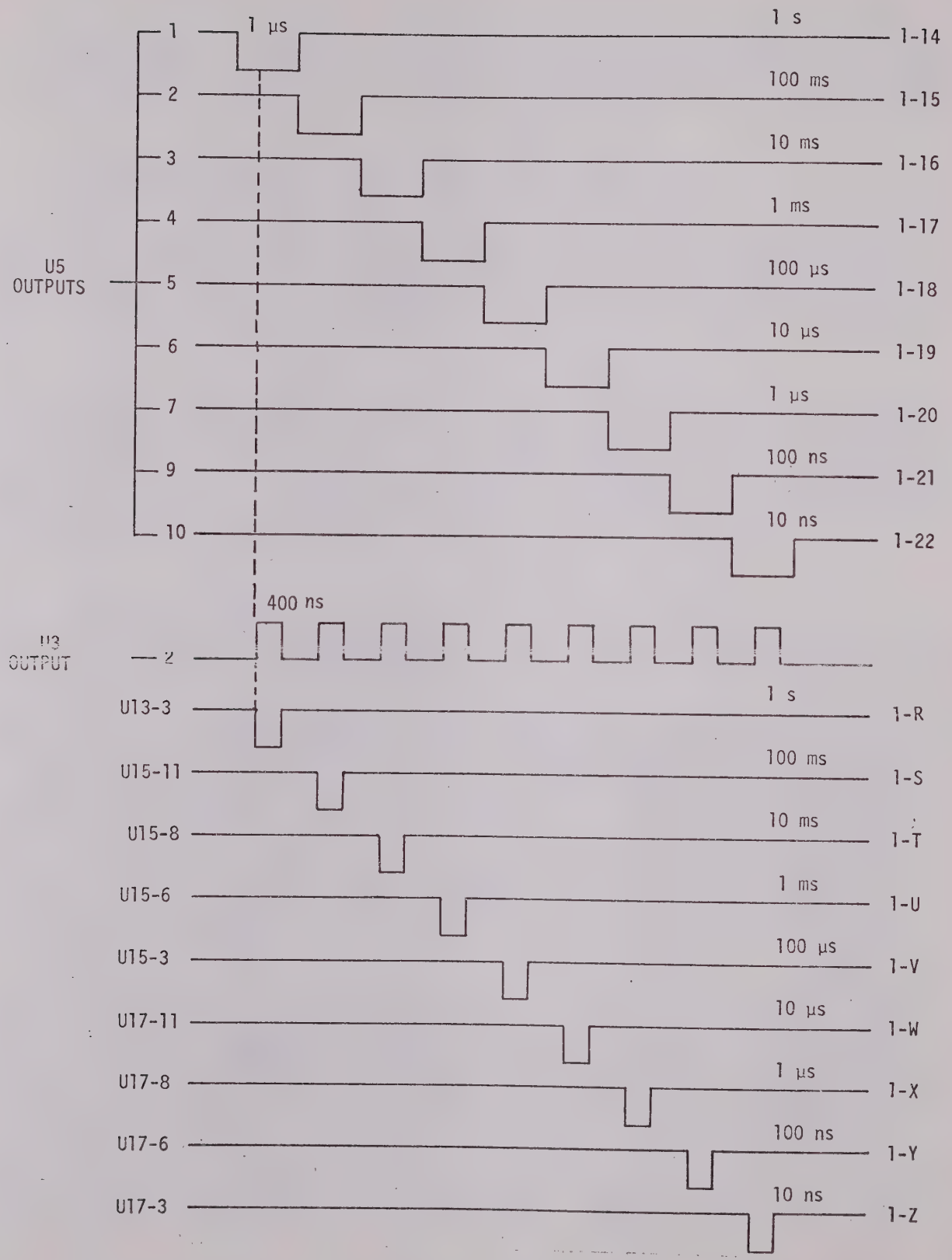



FIGURE 4.2 STROBE GATE OUTPUT TIMING

channel assembly to allow it to accept and store the information from the thumbwheel switch. This updates the entire channel control time information every 10 μs. Figure 4.2 shows the timing relationships between the output from U5, U3,and the strobe gates.

The trigger circuit accepts either an internal trigger from the push-button switch, or an external trigger. The trigger pulse through U1-6 is gated through U7-13 to one shot U22. The 100 MHz clock pulse toggles U22 and the pulse is gated through U21-3, 14, to the triggered gate, U23, U24, U25, U26. These gates are enabled by the front panel trigger source switches. If the TØ trigger source switch is depressed for any channel, the pulse will be gated through to start the count in that channel. The trigger pulse from each channel can also be gated through to start the count in any other channel. The TØ pulse is also gated through U20, U19, and U18 to the output buffer to provide an output for external timing.

If Option 02 is installed, the trigger pulse, through U7-13, is also applied to the triggered time base. OR gate U21-3 is disabled by a high input at pin 2-4, thus effectively blocking any output from U22. The trigger is applied, from the triggered time base, through U21-15, 14, to the triggered gate.

### 4.3.3 Channel Assembly, A10, Schematic #05371001

The channel assembly consists of two interdependent circuits; the storage and count circuit, and the timing and output circuits. Since the channel assemblies are identical for all channels, the following description is applicable to assemblies A13, A17 and A19.

Time code information is applied from the thumbwheel switches through inverters Q1, Q2, Q3, Q4, to storage registers U25 through U32. During this period the strobe pulse from the control assembly, is applied to allow the preset entry into the register. The information set into the storage registers is then available at the inputs of the decade counters, U12 through U18, and U34. Gates U33 are level converters for the output of U32 to the input of U34. When pins 11 of U12 through U18 are strobed by the output of U9-18, the decade counters are preset to the input from the storage registers.

Read in to U34 is controlled by the levels at pins 7 and 9. When these pins are both low, U34 is in the preset condition and will accept the information from U32. When pin 9 is high and pin 7 low, the counter will count down. With pin 9 low and pin 7 high, the counter will count up. If both pins 7 and 9 are high, the counter is stopped. This mode is not used in this instrument. In order to inhibit the counter, pin 10 is held high.

Since there are two operating modes, triggered and repetitive, the triggered mode will be described first. Assume the instrument has been turned on, internal trigger selected, thumbwheel time selection made, and the TØ trigger source switch pressed. U34-7, 9 are both

low and the output of U9-8 is high, therefore, the count is transferred from the storage registers to the decade counters. U23, U36, and U7 are in the reset condition. When the trigger switch is depressed, the TØ pulse is transmitted from the control assembly. The TØ pulse sets the Q output at U23-15, this high starts the gate pulse and sets U34 to count down. The low at U23-14 allows U36, divide-by-three, to trigger on the first 100 MHz clock pulse. U34 is still inhibited by the high at pin 10. When U36-15 goes high the inhibit is removed from U34-10, through U22, and the decades can begin counting to zero. U23-2 is inhibited by the low from U21-3, 14. U9-8 is held high so no count entry can be made from the storage register.

In order to compensate for the three count delay through U36, U34 outputs are programmed so a zero output appears while there are still three counts left in the counter. Decade counter outputs are high when at some count and low at a zero count. U12 through U17 outputs are ANDed through U3 and ORed with U18 outputs through U5. When all the counters are at zero, the pulse through U5-6 enables U7-3 and the clock pulse from U20-5 sets the flip-flop. The high at U7-5 enables U19-6 and U21-3, 14. The pulse from U21-3, 14, enables U23-2 to set and sends out the trigger pulse through U22-2. The pulse from U23-3 clocks U7-9 and the T1 pulse is sent from U7-7. The T1 pulse width is controlled by U6-2, R4, and C1. The high from U23-2 resets U23-14, thus resetting the system until another TØ pulse is received.

If only U34 is programmed and U12 through U18 have zero set into them, U9-8 will be low, holding U7-5 in the preset condition. This holds U10-13 low and the zero count from U34 will fire the trigger pulse and T1 pulse without clocking U7-5.

In the repetitive mode, the channel RECYCLE switch is depressed. The outputs of U10 are reversed, U10-3 high, U10-1 low. The high from U10-3 holds U23-2 in the preset condition. U23-14 and U36 are held in the reset condition. U34 pin 9 is high and pin 7 is low, allowing the counter to count up and operate as a straight decade prescaler. The output of U9-8 is held high, inhibiting the decade counter from updating the preset count. The output circuit operates in a normal manner except that U22-2 is inhibited and the trigger pulse output is developed through U10-14 and U22-14. No output gate signal is generated.

### 4.3.4 Output Buffer Assembly, A15, Schematic #05371901

The output buffers provide isolation, power gain, and inversion for the output signals. In the pulse buffers, the PNP transistor is normally quiescent. When a negative pulse is coupled across the RC network, the transistor turns on and a positive pulse appears at the output.

The gate buffers use NPN and PNP transistors with the collectors tied through a 50 ohm resistive network. The emitter of the PNP is tied to +5 Vdc and the NPN emitter is ground. With the signal high, the

the PNP is off and no signal is present at the output. When a negative pulse is applied, the PNP turns on, applying voltage to the NPN collector and a positive signal of approximately 2 volts is applied to the output, when loaded by 50 ohms.

### 4.3.5 Power Supply, Schematic #7-05366402

The power supply operates from either 115V or 230 Vac. A slide switch, mounted on the rear panel, selects the voltage input level. Two separate transformers are utilized and three full wave rectifiers. One transformer, T1, has a +9 Vdc, +20 Vdc, and a high voltage winding. The +9 Vdc is used to light the POWER ON indicator. This is also regulated to +5 dc. The +20V output is regulated to +15 Vdc. Transformer T2 uses a negative full wave rectifier with an output of -9 Vdc. This is regulated to -2 Vdc and -5.2 Vdc.

### 4.3.6 Thumbwheel Switches, Schematic #7-05365808

Each thumbwheel switch is manually set to a number from 1 through 0. The number is converted to BCD and stored. All thumbwheel switch outputs for a channel are paralleled so only four output wires are required. The thumbwheel is then strobed by the control assembly to apply the stored information to the storage registers in the channel assembly. This information is applied to all the storage registers at the same time. During this strobe period, one of the storage registers, in the channel assembly, is strobed to allow it to accept the information.

# CHAPTER 5
# MAINTENANCE

## 5.1 INTRODUCTION

This chapter contains procedures for adjustment and calibration of the Series Model 600B. It also contains troubleshooting and repair information to aid the user in maintaining the instrument in proper operating condition. Whenever a Systron-Donner instrument requires service, the nearest S-D representative should be contacted. He can provide field service, or arrange factory returns when necessary. Address all inquiries on operation or application to your nearest sales representative; or Sales Manager:

*SYSTRON-DONNER CORPORATION*
*CONCORD INSTRUMENT DIVISION*
10 Systron Drive
Concord, California 94518
Phone: (415) 676-5000
TWX: 910-481-9479
Cable: SYSTRONDONNER

Specify both model and complete serial number in all correspondence.

## 5.2 TEST EQUIPMENT

Table 5.1 lists the minimum test equipment inventory required to maintain the instrument. Items having equivalent characteristics and capabilities may be substituted.

TABLE 5.1 TEST EQUIPMENT

| Type | Used For |
|---|---|
| Oscilloscope (TEKTRONIX Model 7904) with Model 7A12 plug-in Model 7A19 plug-in Model 7B92 plug-in | Circuit tracing, waveforms checks, frequency checks, calibration. |
| Counter/Timer (Systron-Donner Model 6151 with Option 42) | Performance check |
| Digital Multimeter (Systron-Donner Model 7004A) | Voltage and resistance measurement. |
| Frequency Standard (General Technology Model 304B) | Calibration |

## 5.3 ASSEMBLY LOCATION

Location of the major assemblies in the instrument is shown on drawing #05365908 and wiring interconnection on drawing #7-05365808. Detail is shown on the individual assembly drawings.

## 5.4 PERFORMANCE CHECK

The following procedures will check the operational circuits in the Model 604B. When testing other Models in the 600B series, use only those portions of the operational test applicable to the available channels. Required test equipment: S-D Model 6151 Counter/Timer with Option 42. Check oscillator calibration prior to test, section 5.7.

1) Set the Model 604B controls:

| | |
|---|---|
| POWER | ON |
| TRIGGER | INT |
| INT/EXT clock (rear panel) | INT |
| **CHANNEL 1** | |
| TIME INTERVAL | 999999.99 µs |
| TRIGGER SOURCE TØ | Depress |
| **CHANNEL 2** | |
| TIME INTERVAL | 999999.99 µs |
| TRIGGER SOURCE TØ | Depress |
| **CHANNEL 3** | |
| TIME INTERVAL | 999999.99 µs |
| TRIGGER SOURCE TØ | Depress |
| **CHANNEL 4** | |
| TIME INTERVAL | 999999.99 µs |
| TRIGGER SOURCE TØ | Depress |

2) Set the test counter controls:

| | |
|---|---|
| FUNCTION | TIM B-C |
| B LEVEL | Adjust as required, typical, three o'clock. |
| B ATTENUATOR | 1 |
| B DC/AC | DC |
| B SLOPE | (+) |
| C LEVEL | Adjust as required, typical; three o'clock. |
| C ATTENUATOR | 1 |
| C DC/AC | DC |
| C SLOPE | (+) |
| EXT/INT TIME BASE (rear panel) | EXT |

| | |
|---|---|
| SEP/COM | SEP |
| RECYCLE RATE | Full clockwise |
| FAST/SLOW | SLOW |
| RESOLUTION | 10 ns |

3) Connect the TØ OUT connector, on the Model 604B, to the B INPUT connector on the test counter. Connect the Channel 1 PULSE OUT connector to the C INPUT connector on the test counter. Connect the CLK OUT from the rear panel of the Model 604B to the TIME BASE on the rear panel of the Model 6151. Leave this connection until step 23).

*NOTE*

*All readings are ±1 count ± trigger error.*

4) Depress and release the MANual trigger switch. Counter should read 999999.99 µs.

5) Disconnect the instrument from the test counter. Connect the CHANNEL 1 PULSE OUT connector to the B INPUT connector on the test counter.

6) On the test counter, position the FUNCTION switch to PERIOD B, 1.

7) Depress the RECYCLE switch. Counter should read 999999.99 µs.

*NOTE*

*When a channel is operating in the repetitive mode, RECYCLE, no GATE OUT pulse is generated.*

8) Depress the CHANNEL 1 TØ switch. Disconnect the test leads between the Model 604B and the Model 6151 Counter/Timer.

9) Position the SEP/COM switch to COM. Position the C SLOPE switch to (-) negative.

10) Connect the CHANNEL 1 GATE OUT connector to the B INPUT connector. Momentarily depress the MANual trigger switch. Reading should be 999999.99 µs.

11) Perform steps 1) through 10), using the connections for CHANNEL 2, CHANNEL 3, and CHANNEL 4.

12) Change the Model 604B controls as follows:

| Thumbwheel Switches | |
|---|---|
| CHANNEL 1 | 333333.33 µs |
| CHANNEL 2 | 222222.22 µs |
| CHANNEL 3 | 222222.22 µs |
| CHANNEL 4 | 222222.22 µs |
| TRIGGER SOURCE | |
| CHANNEL 1 | TØ |

| | |
|---|---|
| CHANNEL 2 | CH 1 |
| CHANNEL 3 | CH 2 |
| CHANNEL 4 | CH 3 |

13) On the Model 6151 test counter, position the FUNCTION switch to TIM B C, the SEP/COM switch to SEP and the C SLOPE switch to (+) positive.

14) Connect the TØ OUT connector to the B INPUT connector and the CHANNEL 4 PULSE OUT connector to the C INPUT connector.

15) Depress the MANual trigger switch. Readout should be 999999.99 µs.

16) Depress the MANual trigger switch. Within one second depress the STOP switch. Instrument should stop until the trigger switch is again depressed. The GATE light on the test counter will remain ON until another trigger is received by the instrument.

17) Repeat steps 12) through 15) using various channel triggering combinations.

18) Set the Model 604B controls:

| | |
|---|---|
| POWER | ON |
| TRIGGER | EXT |
| INT/EXT Clock (rear panel) | INT |

Thumbwheel switches as shown in 1).

| | |
|---|---|
| CHANNEL 1 | TØ |

19) Set the Model 6151 Counter/Timer controls as shown in 2) above.

20) Connect an external triggering source, greater than 2.0 V, to the EXT TRIG BNC connector on the Model 604B front panel. Trigger pulses must be more than 1s apart.

21) Repeat step 3). Reading should be 999999.99 µs.

22) Disconnect the external trigger source. Position the TRIGGER switch to INT. On the rear panel, position the INT/EXT clock switch to EXT.

23) Connect the 10 MHz OUT BNC connector on the Model 6151 to the CLOCK IN BNC connector on the rear panel of the Model 604B.

24) Depress the MANual trigger switch, reading should be 999999.99 µs.

## 5.5 INSTRUMENT COVER REMOVAL

1) Top cover - Remove the two flush-mounted screws which are exposed on the top cover. Slide the cover to the rear and lift away from the instrument.

2) Bottom cover - Remove the two flush-mounted screws which

are located toward the two edges of the cover. Slide the cover to the rear and lift away from the instrument.

## 5.6 PRINTED CIRCUIT BOARD REPAIR

When replacing integrated circuits or other electronic components soldered to printed-circuit boards, the procedures indicated below must be followed or damage to the board may result:

1) Determine, by troubleshooting techniques, which integrated circuit or discrete component(s) has failed.

2) Remove the defective component(s) from the board by cutting the pins or leads with a small diagonal clipping tool. (Always remove and replace the entire component.)

3) Apply heat (40-50W soldering iron) sparingly to each of the cut pins or leads and remove from the board; clean the hole(s) with a toothpick or solder suction tool.

4) Form the tinned leads of the replacement part and insert in the printed circuit holes; solder, then trim leads to extend 1/16-inch beyond the back surface of the board. (Use only 62-37 solder with maximum 1/16-inch diameter.)

*CAUTION*

*Always trim semiconductor leads only after soldered installation is complete. This procedure greatly lessens the possibility of component failure due to shock-wave damage caused by the trimming tool.*

5) When soldering semiconductor devices and all small components, be sure to use a heat sink tool or long-nosed plier connected to the component lead(s) while each is being soldered. Allow the soldered connection to cool before removing the heat sink.

6) Clean all dirt and solder-flux from the printed circuit traces by liberal application of isopropyl alcohol or freon-type solvents.

## 5.7 CALIBRATION

The 10 MHz oscillator circuit, mounted on A16, the control assembly, schematic #7-05371201, is the only circuit which requires periodic adjustment. Test equipment required: frequency standard and oscilloscope.

1) Set the Model 604B controls:

| | |
|---|---|
| POWER | ON |
| TRIGGER | INT |
| INT/EXT Clock (rear panel) | INT |

2) Connect the frequency standard output to the external sync of the oscilloscope.

3) Connect the CLK OUT, rear panel, to the vertical input of the oscilloscope.

4) Adjust A16C1 and A16C2 for a stable waveform on the oscilloscope display.

## 5.8 MAINTENANCE

The only routine maintenance required is periodic cleaning of the intake air filter and the external surfaces. Should the instrument fail to operate, troubleshooting techniques must be used to isolate the malfunction. The following sections may be used as a guide for trouble isolation:

### 5.8.1 Troubleshooting

Prior to initiating troubleshooting procedures, perform the following checks:

1) Ensure the line cord is plugged in and line power is available to the instrument.

2) Check the line-change switch to assure it is in the proper position for the available voltage.

3) Check to ensure the correct fuse is installed in the instrument.

### 5.8.2 Power Supply, Schematic #7-05366402

Although there are no adjustments on the power supply, the following checks must be made to ensure proper instrument operation. Test equipment required: digital multimeter.

1) Disconnect the power cord from the line voltage and position the power switch to OFF.

2) With the Digital Multimeter, measure the resistance between the high and low side of the line cord. Reading should be infinity.

3) Position the power switch to ON. Reading should be <20Ω.

4) Connect the power cord to the line voltage.

5) Power supply inputs to the individual boards may be measured at the pins shown in table 5.2.

TABLE 5.2 VOLTAGE MEASUREMENTS

| Board No. | Pin Number | | | | |
|---|---|---|---|---|---|
| | +5.0V ±0.25V | GND | -5.2V ±0.25V | -2V ±.1V | +15V ±.45V |
| A3 | 2-21, Y | 1-1,A,2-Z,22 | 2-X,20 | 1-9K 2-W, 19 | 1-2,B |
| A4 | 2-21, Y | 1-1,A,2,3,4, 5,6,14,R,22,Z | 2-X,20 | 2-W, 19 | --- |
| A10 | 2-21, Y | 1-1,A: 2-1,A, K,J,H,F,G,T, Z,22 | 2-X,20 | 2-W, 19 | --- |
| A13 | 2-21, Y | 1-1,A: 2-1,A, K,J,H,F,T,Z,22 | 2-X,20 | 2-W, 19 | --- |
| A15 | 2-21, Y | 1-1,A,2 thru 13, 2-1 thru 8,22,Z | --- | --- | --- |
| A16 | 2-21, Y | 1+1,A,3,4,5: 2-3,4,5,6,7, 8,9,10,22,Z | 2-X,20 | 2-W, 19 | --- |
| A17 | 2-21, Y | 1-1,A: 2-1,A, K,J,H,F,E,T, Z,22 | 2-X,20 | 2-W, 19 | --- |
| A19 | 2-21, Y | | 2-X,20 | 2-W, 19 | --- |

5.8.3 Control Assembly, A16, Schematic #7-05371201

The control assembly incorporates three major circuits, time base circuit, strobe circuit, and trigger circuit. Table 5.3 is a trouble-shooting chart to assist the technician in trouble isolation. Test equipment required: oscilloscope, test counter, and digital multi-meter.

When making the checks shown in Table 5.3, the trigger switch and the internal or external clock switch must be properly positioned for the check being performed. When checking the output of the strobe circuit, connect the output of U5 to one trace and probe the appro-priate output of U13, U15, and U17. The strobe pulse from U13, U15, and U17 should fall within the pulse time from U5, see Figure 4.1.

5.8.4 100 MHz Multiplier Assembly, A4, Schematic #7-05371401

Prior to troubleshooting the 100 MHz multiplier, ensure that the 10 MHz oscillator is operating correctly and the interface connection from the multiplier to the faulty channel input is satisfactory. Test equipment required: oscilloscope, digital multimeter.

1) Check power supply voltages.

2) Check 10 MHz signal at U6-1 and U6-8.

3) Check 100 MHz signal at U4-14.

4) Check clock output to channels. If no output from any channel, check gate input at U5-8.

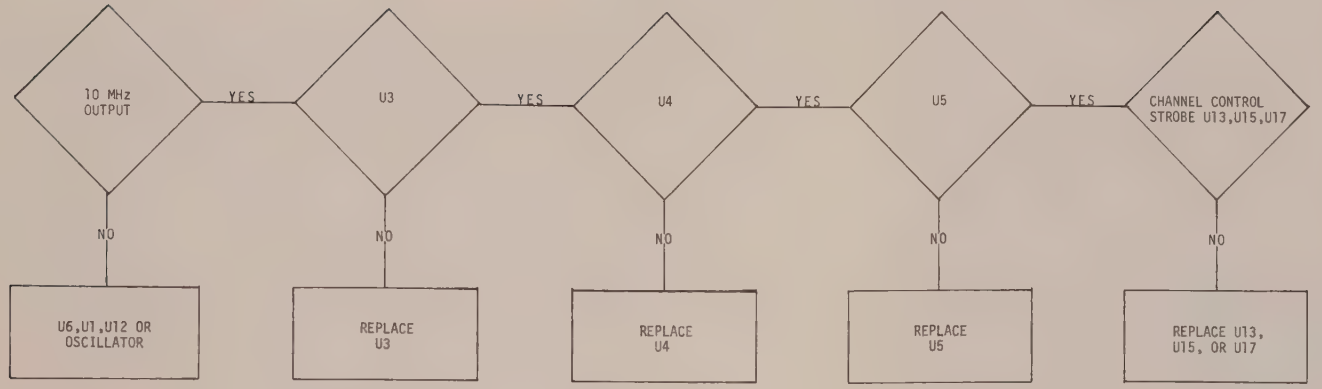
5.8.5 Channel Assembly, A10, A13, A17, and A19, Schematic #7-05371001

There are two interdependent circuits in the channel assembly; the storage register and count register circuits, and the timing and output circuit. Table 5.4 is a troubleshooting chart for the channel assembly. Test equipment required: oscilloscope, digital multimeter.

5.8.6 Output Buffer Assembly, A15, Schematic #7-05371901

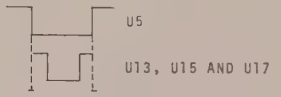
When troubleshooting the output buffers, check the power supply voltage, input signals, and output signals. If a buffer is malfunctioning, check the discrete components in the circuit. Required test equipment: digital multimeter and oscilloscope.

## OSCILLATOR AND STROBE CIRCUITS




NOTES:

1. WHEN CHECKING CHANNEL CONTROL STROBE, THE PULSE FROM U13, U15 and U17 MUST FALL WITHIN THE TIME OF THE PULSE FROM U5.




2. WHEN OPTION 02, TRIGGERED TIME BASE, IS INSTALLED, THE TRIGGER PULSE MUST BE MEASURED AT PIN 2-A. PIN 2-4 MUST BE HIGH FOR THE TRIGGER PULSE TO PASS THROUGH U21.

## TRIGGER CIRCUIT

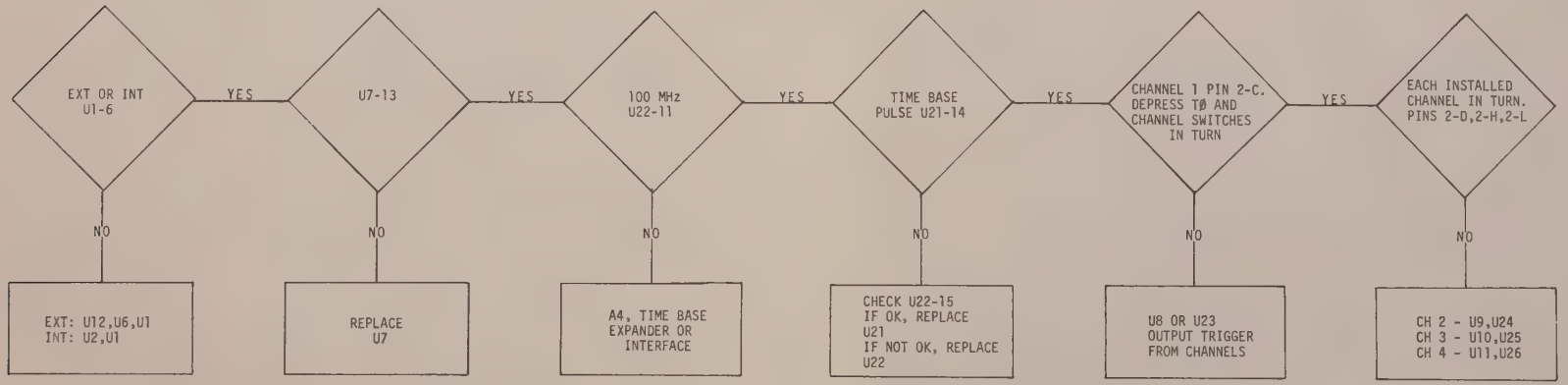



TABLE 5.3 CONTROL ASSEMBLY TROUBLESHOOTING CHART

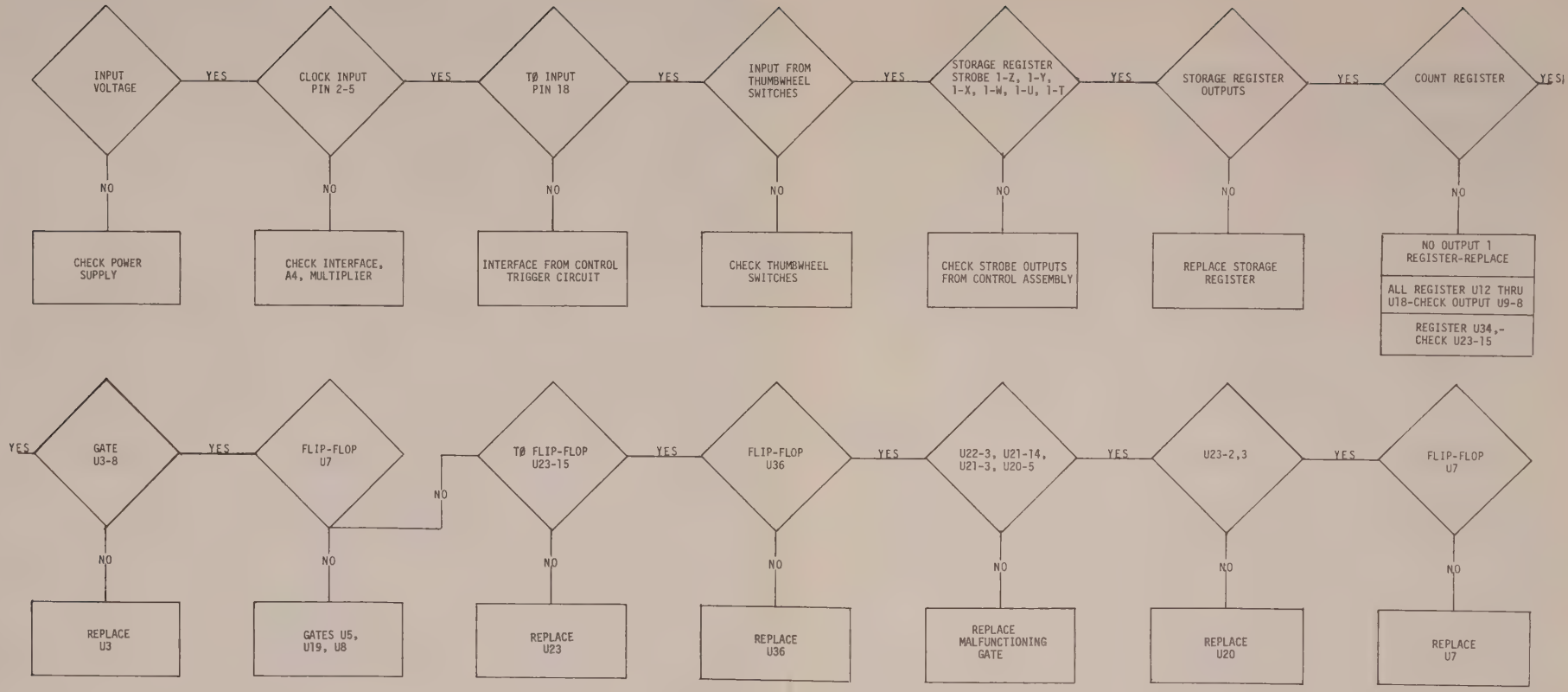



TABLE 5.4 CHANNEL ASSEMBLY

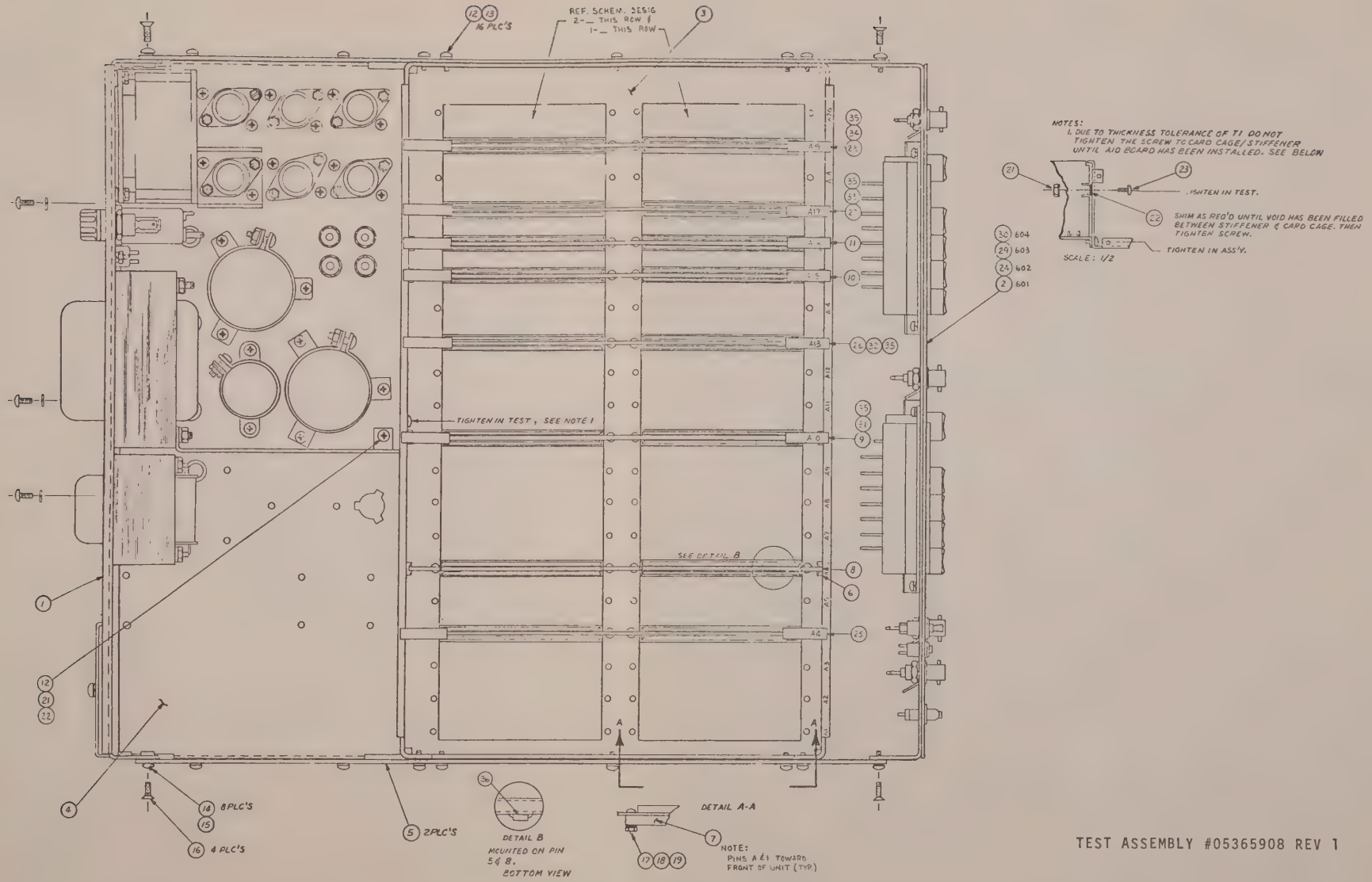
TROUBLESHOOTING CHART

# CHAPTER 6
# DRAWINGS

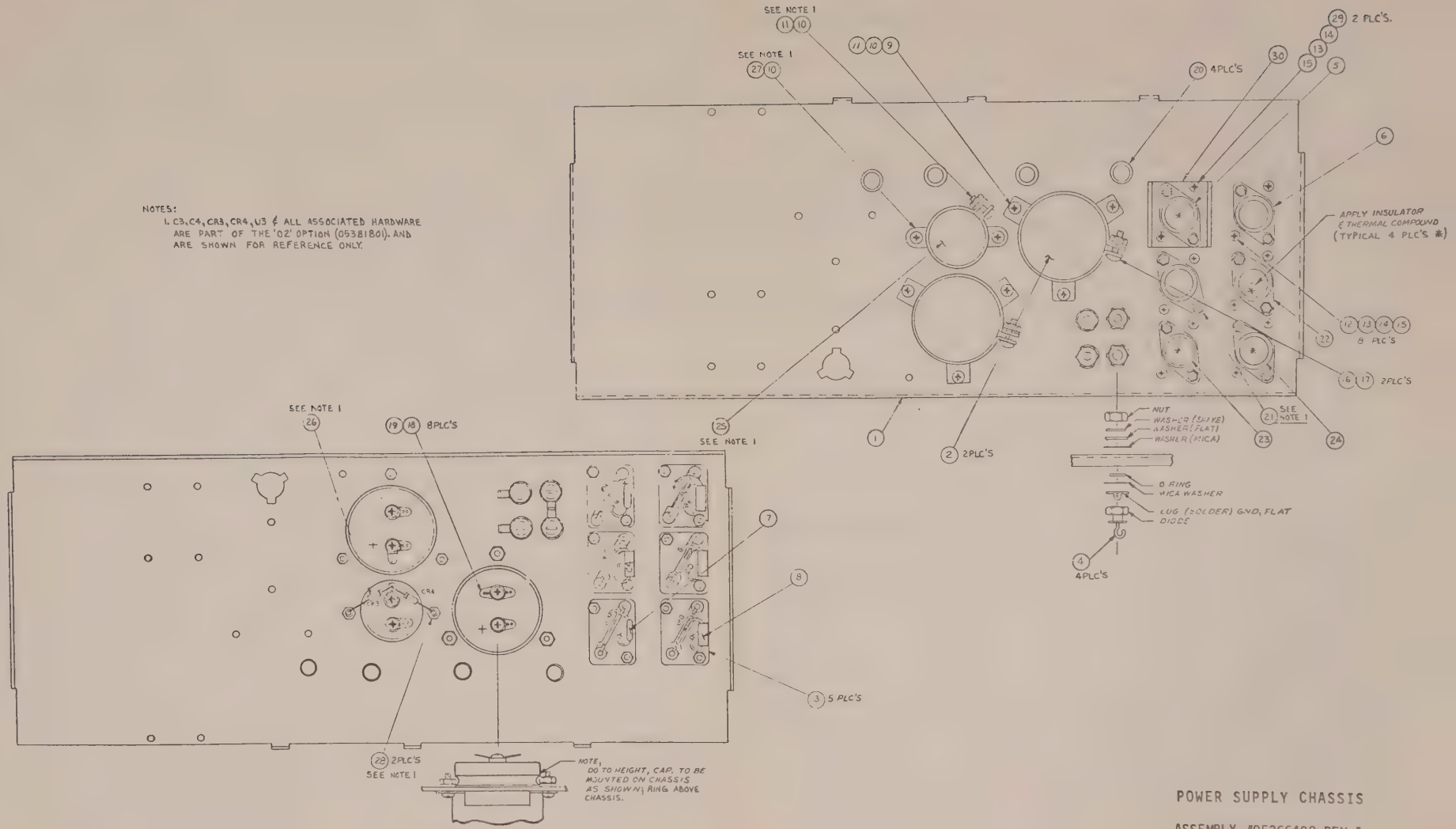
## 6.1 INTRODUCTION

Assembly and schematic drawings of the basic instrument are contained in this chapter. These are arranged with the test assembly followed by the front and rear panel assemblies and the wiring interconnect schematic. The A numbered board assembly/schematic drawings follow in alphameric order. Replaceable parts lists, in chapter 8, are arranged in the same manner.

Assembly/schematic drawings and replaceable parts lists for standard options are contained in Chapter 8 and are arranged in a package format.

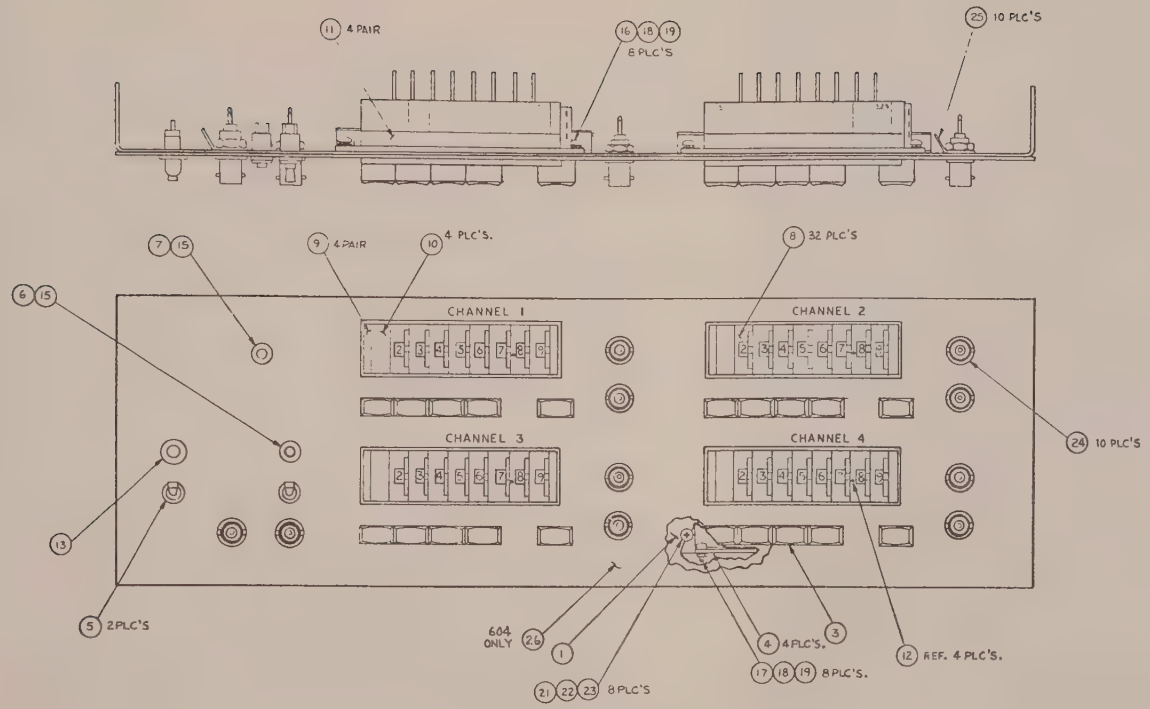


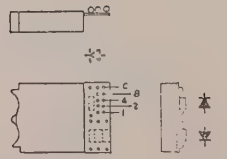

TEST ASSEMBLY #05365908 REV 1



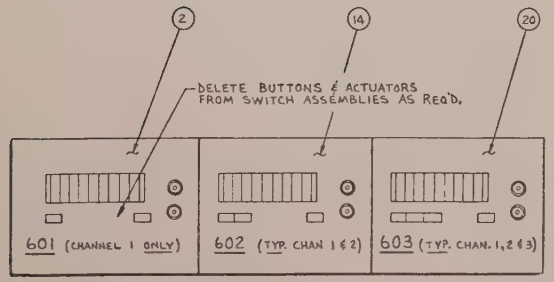

POWER SUPPLY CHASSIS

ASSEMBLY #05366402 REV 1



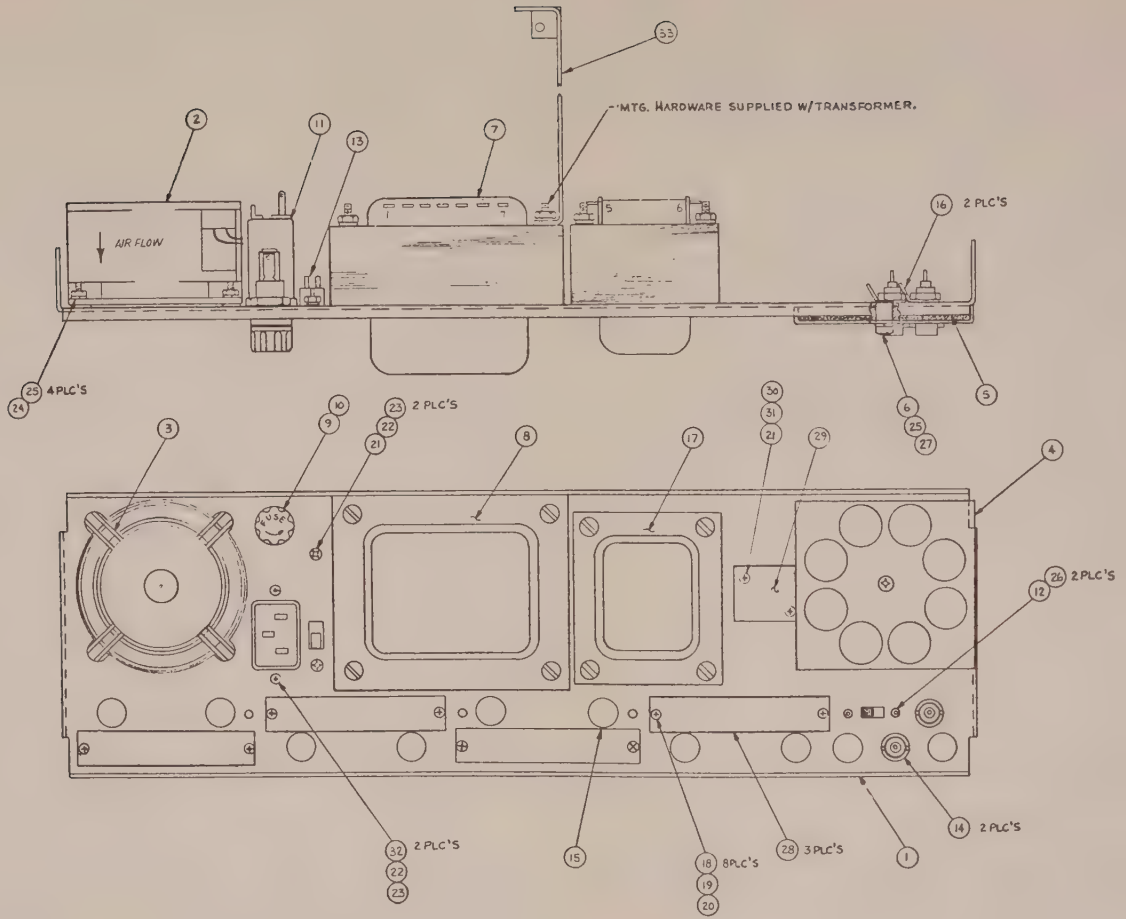



THUMBWHEEL SWITCH #05130005



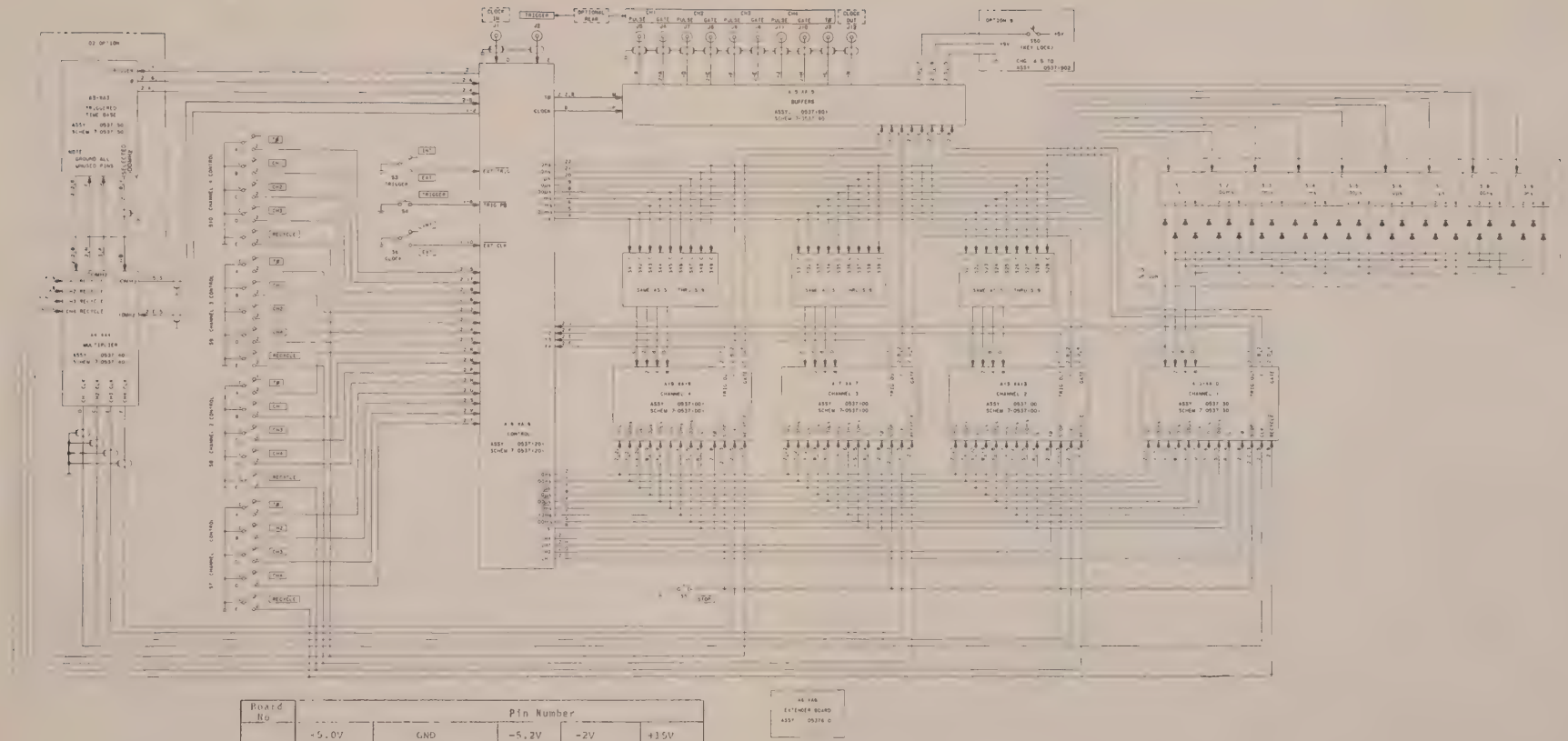

SHOWN IN 604 CONFIGUATION

FRONT PANEL ASSEMBLY #05366008 REV 1




REAR PANEL ASSEMBLY

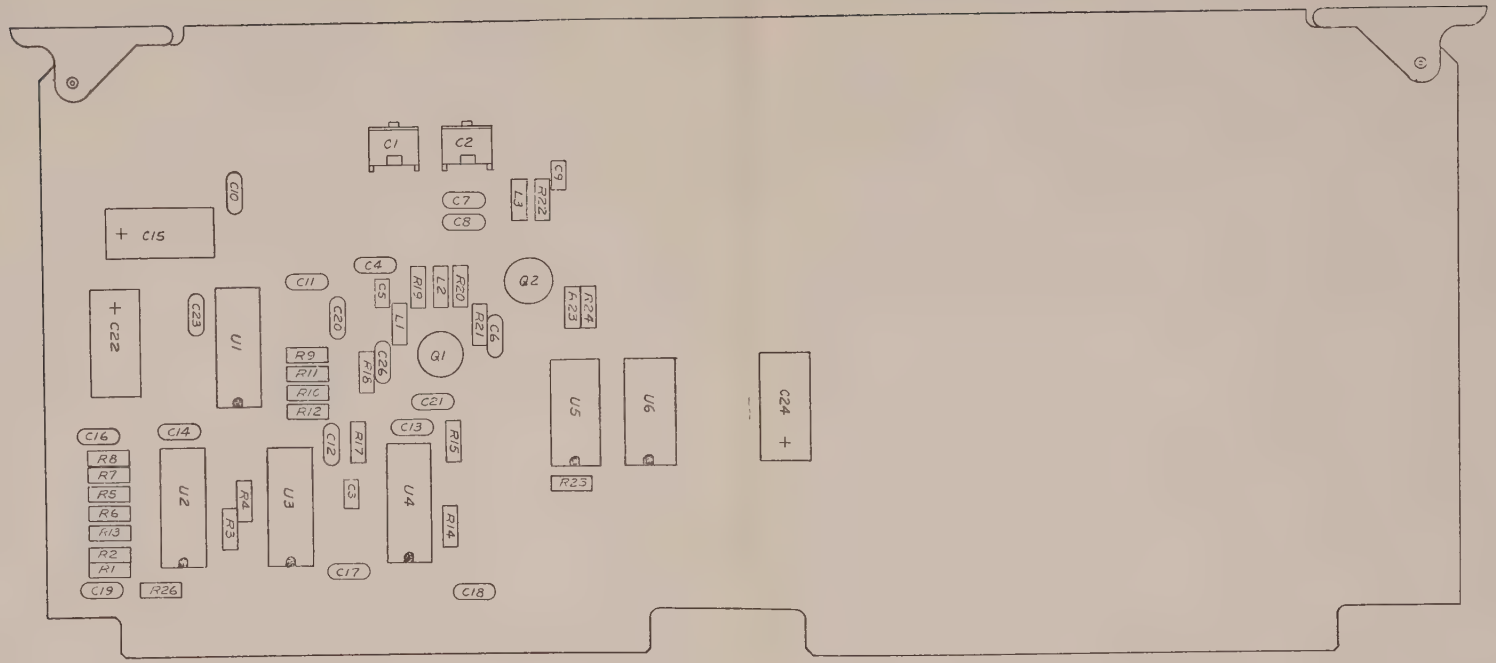
#05366102 REV 1



| Board No | Pin Number | | | | |
|---|---|---|---|---|---|
| | +5.0V ±0.25V | GND | -5.2V ±0.25V | -2V ±.1V | +15V ±.45V |
| A3 | 2-21, Y | 1-1,A,2-2,22 | 2-X,20 | 1-9K 2-W, 19 | 1-2,B |
| A4 | 2-21, Y | 1-1,A,2,3,4, 5,6,14,R,22,Z | 2-X,20 | 2-W, 19 | --- |
| A10 | 2-21, Y | 1-1,A; 2-1,A, K,J,H,F,G,I, Z,22 | 2-X,20 | 2-W, 19 | --- |
| A13 | 2-21, Y | 1-1,A; 2-1,A, K,J,H,F,T,R,22 | 2-X,20 | 2-W, 19 | --- |
| A15 | 2-21, Y | 1-1,A,2 thru 13, 2-1 thru 8,22,Z | --- | --- | --- |
| A16 | 2-21, Y | 1+1,A,3,4,5; 2-3,4,5,6,7, 8,9,10,22,Z | 2-X,20 | 2-W, 19 | --- |
| A17 | 2-21, Y | 1-1,A; 2-1,A, K,J,H,F,E,T, Z,22 | 2-X,20 | 2-W, 19 | --- |
| A19 | 2-21, Y | | 2-X,20 | 2-W, 19 | --- |

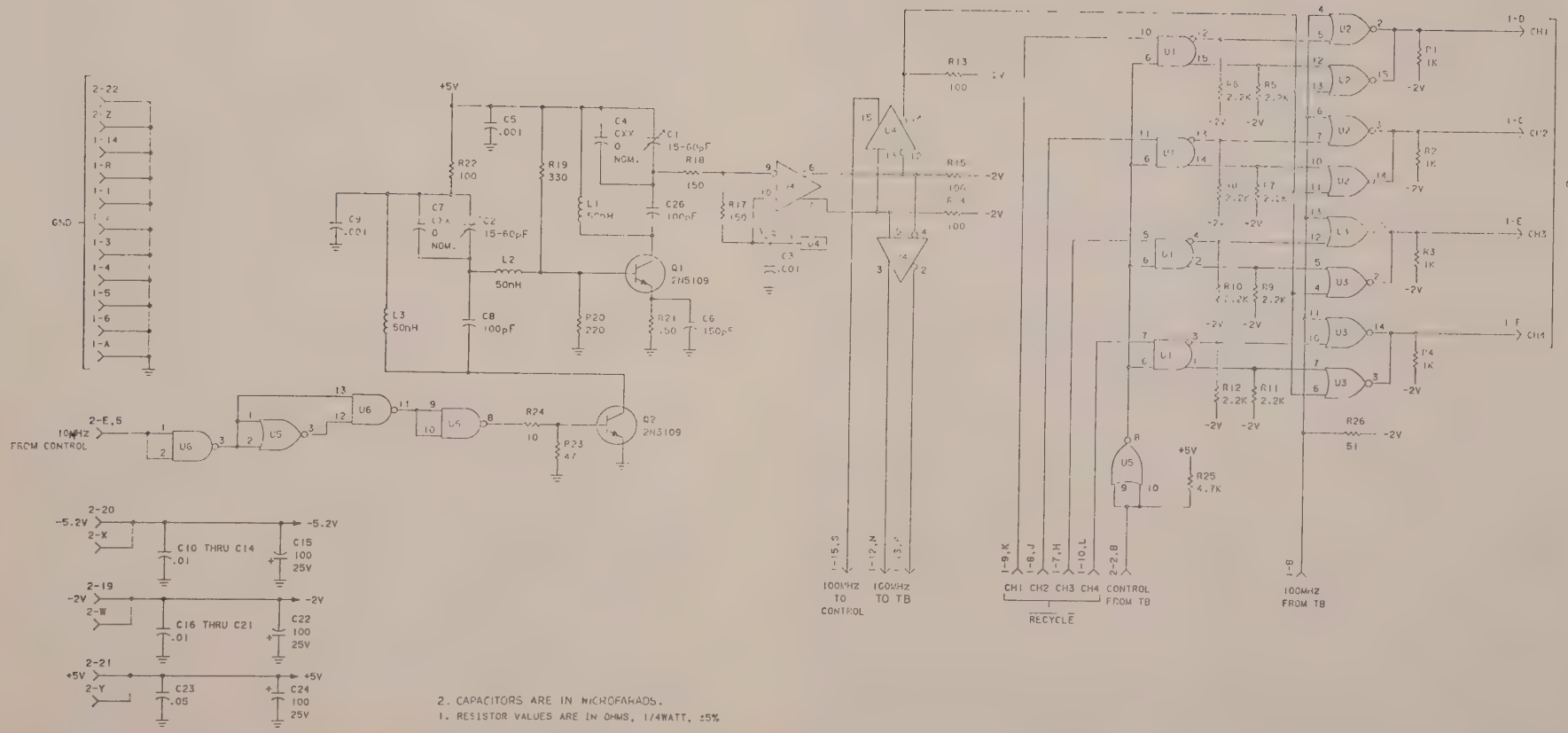
WIRING INTERCONNECT

SCHEMATIC #7-05365808 REV 1




A4, 100 MHz MULTIPLIER ASSEMBLY

#05371401 REV 2

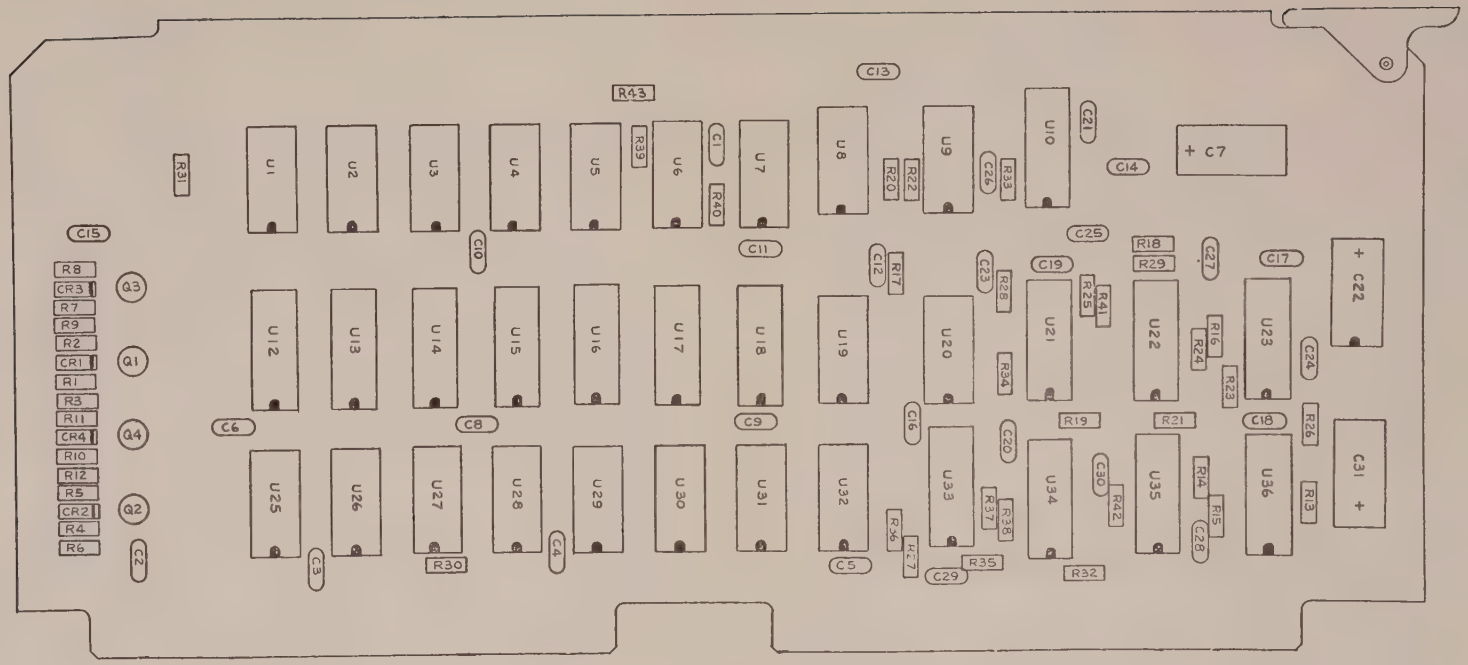



2. CAPACITORS ARE IN MICROFARADS.
1. RESISTOR VALUES ARE IN OHMS, 1/4WATT, ±5%

NOTES: UNLESS OTHERWISE SPECIFIED

A4, 100 MHz MULTIPLIER SCHEMATIC

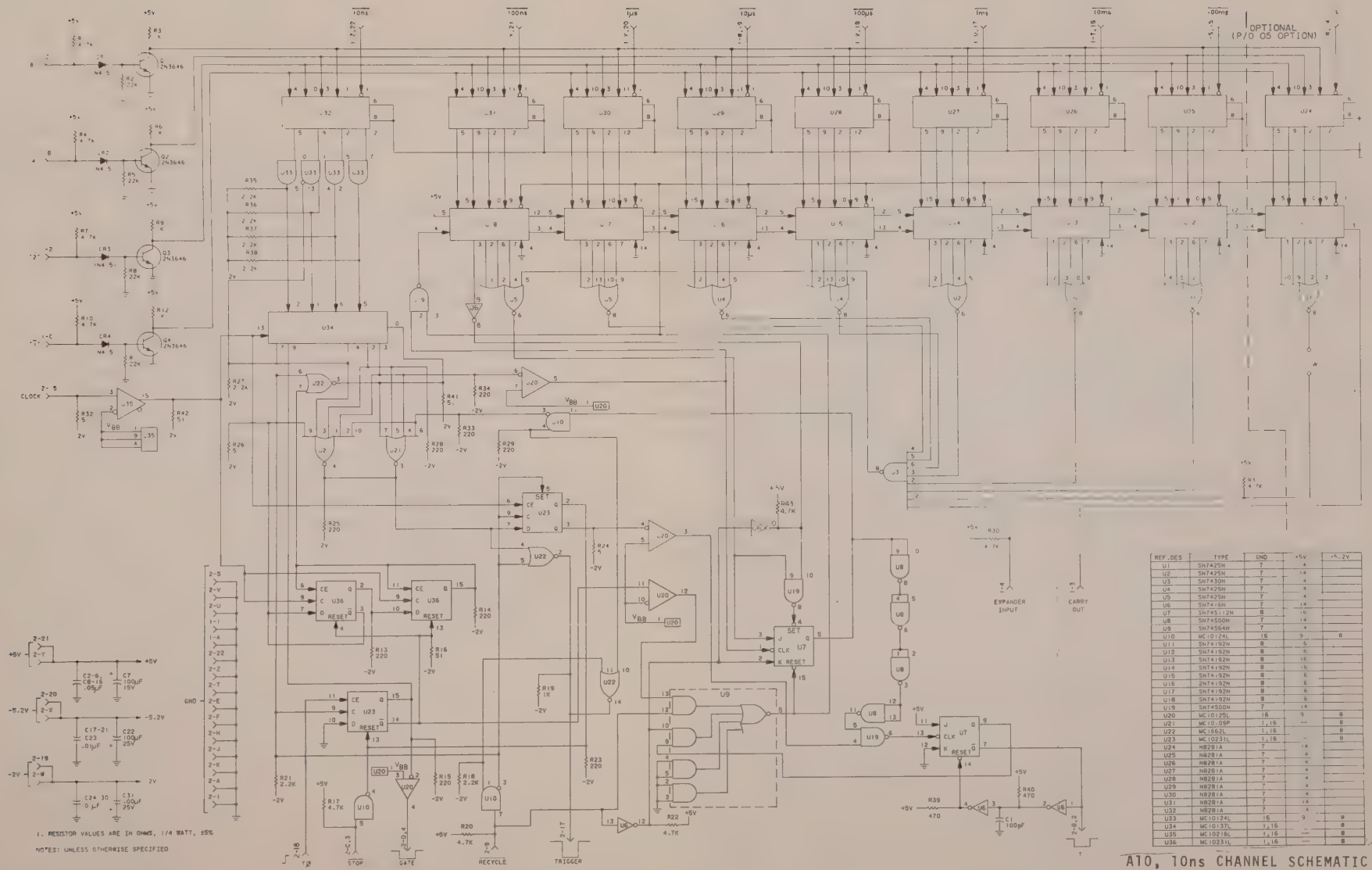
#7-05371401 REV 1




NOTE: A13, A17, AND A19 ARE IDENTICAL TO A10.

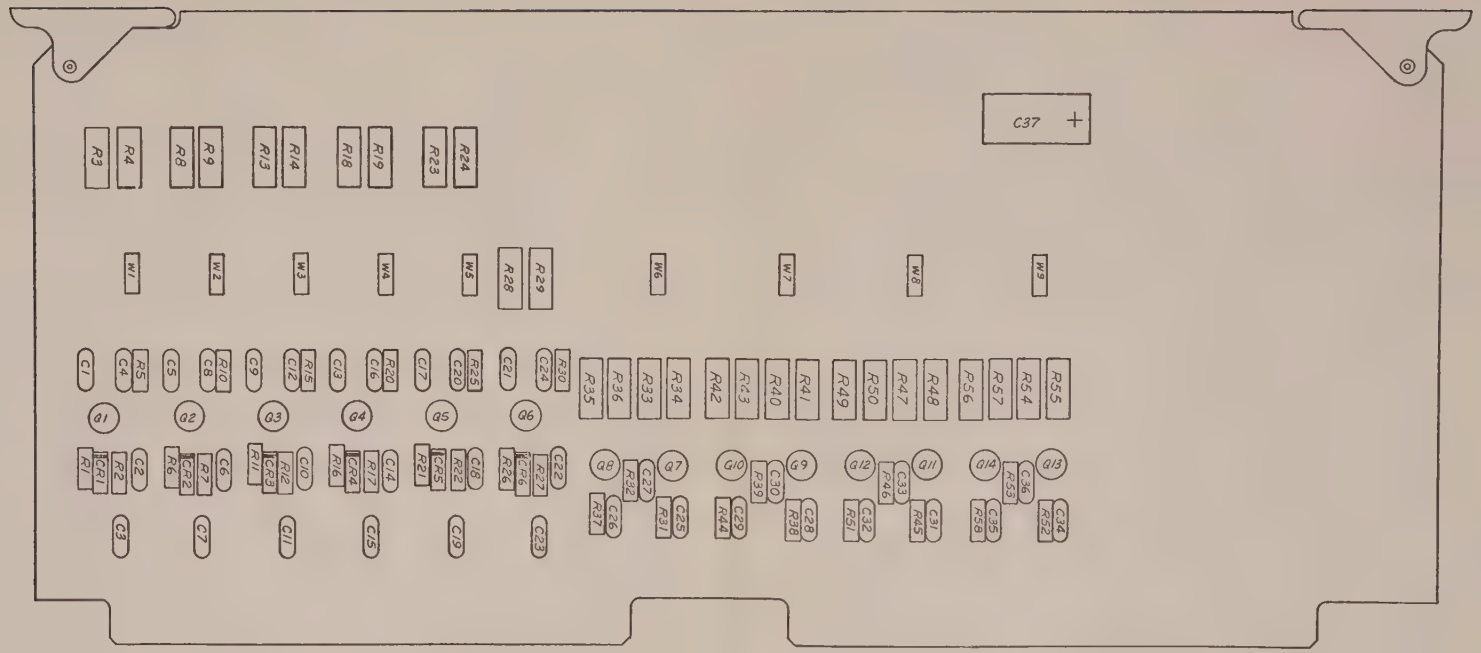
A10, 10ns CHANNEL ASSEMBLY

#05371001 REV 1



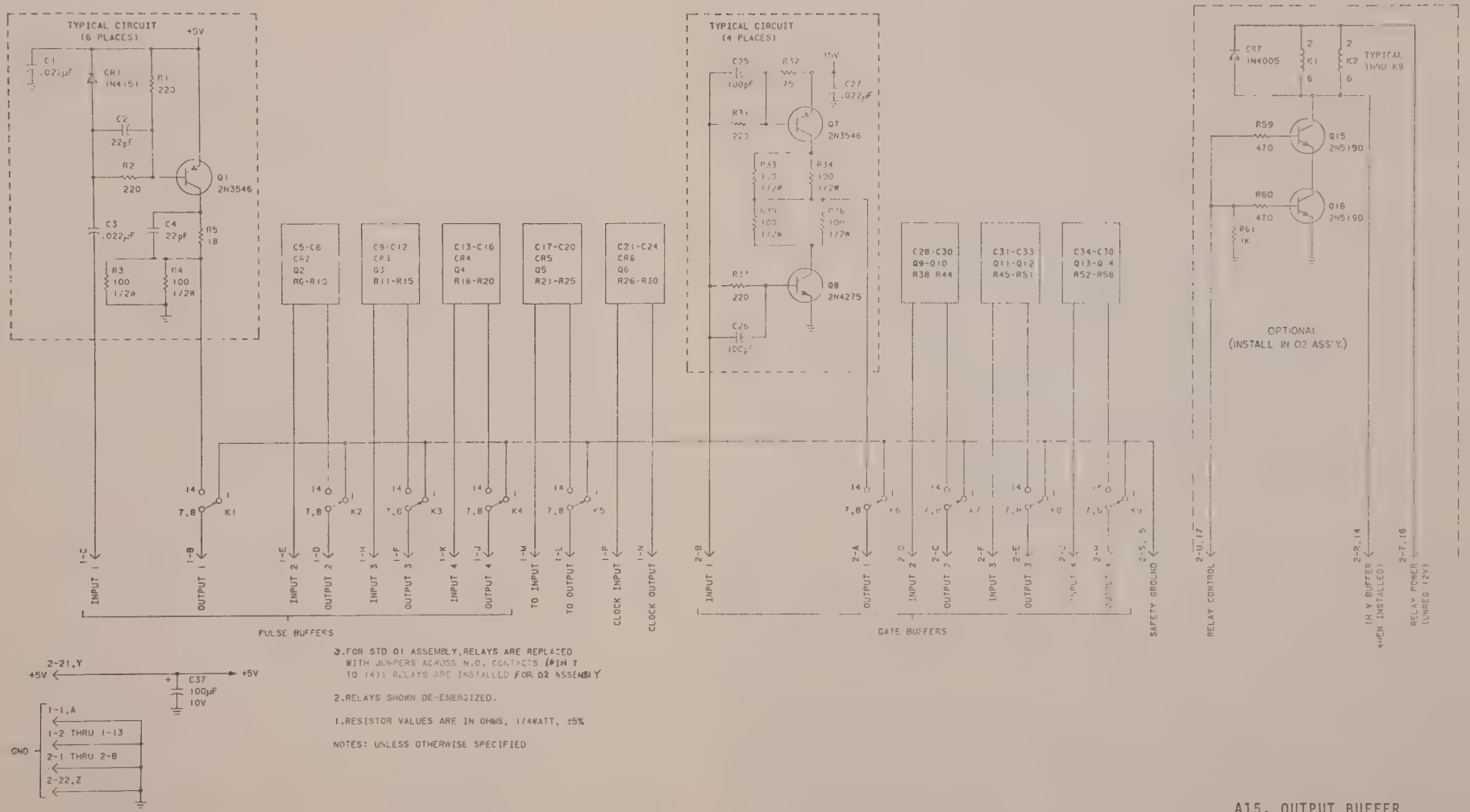

| REF DES | TYPE | GND | +5V | +5.2V |
|---|---|---|---|---|
| U1 | SN7425N | 7 | 4 | |
| U2 | SN7425N | 7 | 4 | |
| U3 | SN7430N | 7 | 4 | |
| U4 | SN7425N | 7 | 4 | |
| U5 | SN7425N | 7 | 4 | |
| U6 | SN7416N | 7 | 14 | |
| U7 | SN74S112N | 8 | 16 | |
| U8 | SN74S00N | 7 | 14 | |
| U9 | SN74S64N | 7 | 4 | |
| U10 | MC10124L | 16 | 9 | 8 |
| U11 | SN74192N | 8 | 5 | |
| U12 | SN74192N | 8 | 6 | |
| U13 | SN74192N | 8 | 16 | |
| U14 | SN74192N | 8 | 16 | |
| U15 | SN74192N | 8 | 6 | |
| U16 | 2N74192N | 8 | 6 | |
| U17 | SN74192N | 8 | 6 | |
| U18 | SN74192N | 8 | 6 | |
| U19 | SN74S00N | 7 | 14 | |
| U20 | MC10125L | 16 | 9 | 8 |
| U21 | MC10109P | 1,16 | -- | 8 |
| U22 | MC1662L | 1,16 | -- | 8 |
| U23 | MC10231L | 1,16 | -- | 8 |
| U24 | N8281A | 7 | 14 | |
| U25 | N8281A | 7 | 4 | |
| U26 | N8281A | 7 | 4 | |
| U27 | N8281A | 7 | 4 | |
| U28 | N8281A | 7 | 4 | |
| U29 | N8281A | 7 | 4 | |
| U30 | N8281A | 7 | 4 | |
| U31 | N8281A | 7 | 14 | |
| U32 | N8281A | 7 | 4 | |
| U33 | MC10124L | 16 | 9 | 8 |
| U34 | MC10137L | 1,16 | -- | 8 |
| U35 | MC10216L | 1,16 | -- | 8 |
| U36 | MC10231L | 1,16 | -- | 8 |

A10, 10ns CHANNEL SCHEMATIC




A15, OUTPUT BUFFER ASSEMBLY

#05371901 REV 1




3.FOR STD 01 ASSEMBLY, RELAYS ARE REPLACED WITH JUMPERS ACROSS N.O. CONTACTS (PIN 7 TO 14); RELAYS ARE INSTALLED FOR 02 ASSEMBLY

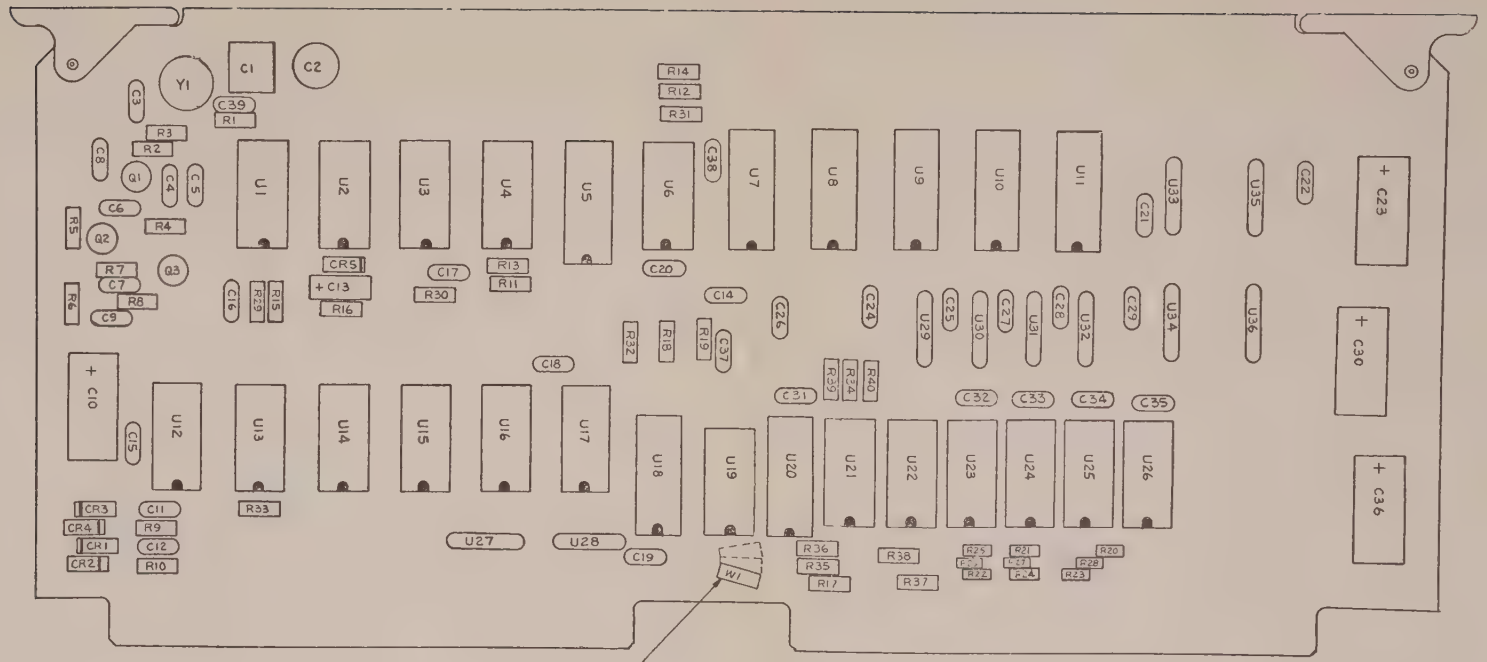
2.RELAYS SHOWN DE-ENERGIZED.

1.RESISTOR VALUES ARE IN OHMS, 1/4WATT, ±5%

NOTES: UNLESS OTHERWISE SPECIFIED

A15, OUTPUT BUFFER

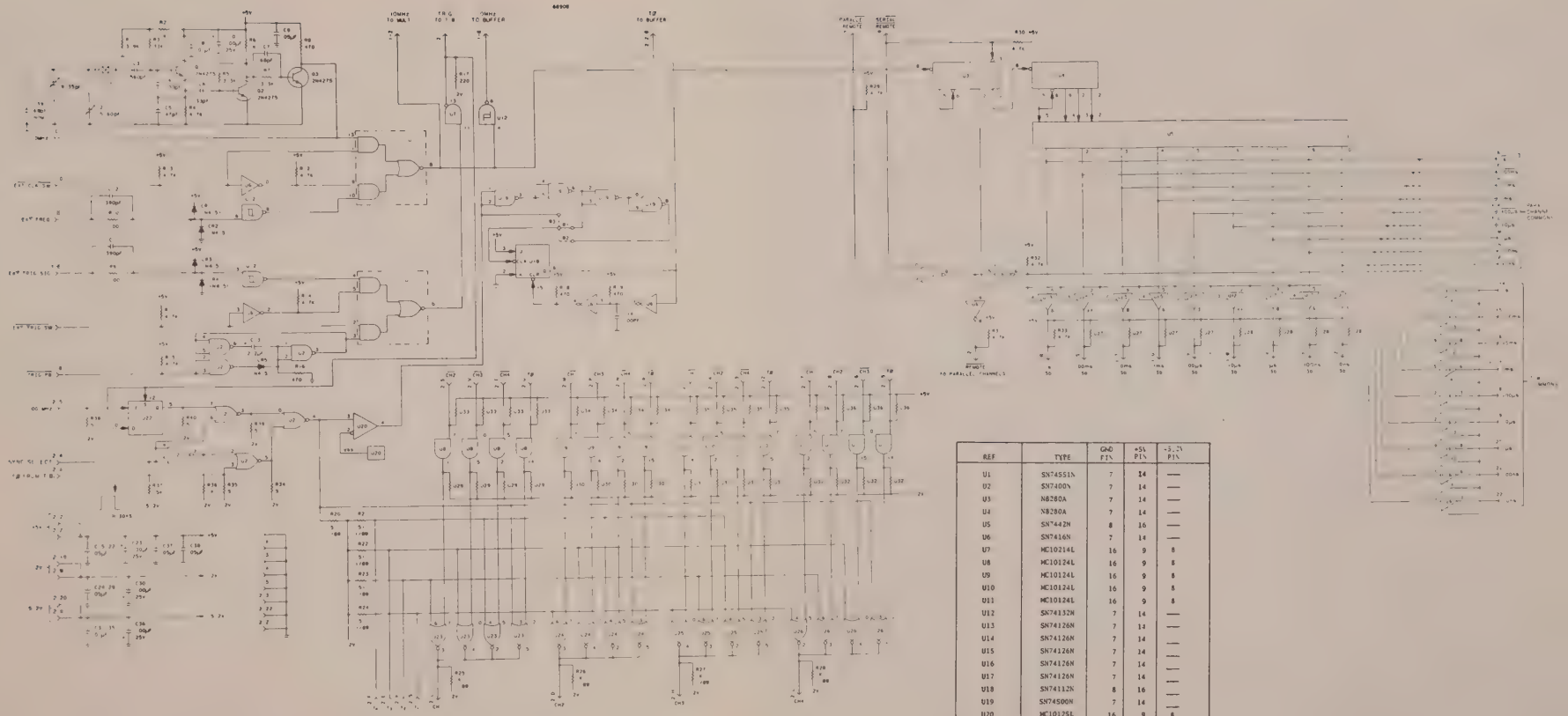
SCHEMATIC #7-05371901 REV 1




W1 IS A CALIBRATION POINT & MAY BE INSTALLED IN ONE OF THREE POSITIONS AS SHOWN.

A16, 10ns CONTROL ASSEMBLY

#05371201 REV 1



| REF | TYPE | GND PIN | +5V PIN | -5.2V PIN |
|---|---|---|---|---|
| U1 | SN74551N | 7 | 14 | — |
| U2 | SN7400N | 7 | 14 | — |
| U3 | N8280A | 7 | 14 | — |
| U4 | N8280A | 7 | 14 | — |
| U5 | SN7442N | 8 | 16 | — |
| U6 | SN7416N | 7 | 14 | — |
| U7 | MC10214L | 16 | 9 | 8 |
| U8 | MC10124L | 16 | 9 | 8 |
| U9 | MC10124L | 16 | 9 | 8 |
| U10 | MC10124L | 16 | 9 | 8 |
| U11 | MC10124L | 16 | 9 | 8 |
| U12 | SN74132N | 7 | 14 | — |
| U13 | SN74126N | 7 | 14 | — |
| U14 | SN74126N | 7 | 14 | — |
| U15 | SN74126N | 7 | 14 | — |
| U16 | SN74126N | 7 | 14 | — |
| U17 | SN74126N | 7 | 14 | — |
| U18 | SN74112N | 8 | 16 | — |
| U19 | SN74500N | 7 | 14 | — |
| U20 | MC10125L | 16 | 9 | 8 |
| U21 | MC1662L | 1,16 | — | 8 |
| U22 | MC10231L | 1,16 | — | 8 |
| U23 | MC1662L | 1,16 | — | 8 |
| U24 | MC1662L | 1,16 | — | 8 |
| U25 | MC1662L | 1,16 | — | 8 |
| U26 | MC1662L | 1,16 | — | 8 |

NOTES: UNLESS OTHERWISE SPECIFIED

1. RESISTOR VALUES ARE IN OHMS, 1/4 WATT,
2. U27 THROUGH U36 ARE RESISTOR MODULES 5k P/N 027867

A16, 10ns CONTROL SCHEMATIC

#7-05371201 REV 1

# CHAPTER 7
# REPLACEABLE PARTS LIST

## 7.1 INTRODUCTION

This chapter contains a list of replaceable parts for the instrument. The lists are arranged in order beginning with the final assembly followed by the subassemblies and the "A" numbered boards in numerical order. A manufacturer's code-to-name cross reference list is included to assist in obtaining replacement parts.

## 7.2 MANUFACTURER'S INDEX

For the convenience of the user, a list of manufacturers by code, as shown in the H-4 Federal Supply Catalogue, is contained in Table 7.1.

TABLE 7.1 CODE-TO-NAME CROSS-REFERENCE

| Code | Name | Address |
|---|---|---|
| 01121 | Allen-Bradley Co. | 1201 South 2nd St., Milwaukee, WI 53204 |
| 01295 | Texas Instruments Inc. | 13500 N. Central Expressway, Dallas, TX 75231 |
| 03508 | General Electric Co. Semiconductor Products Dept. | Electronics Park, Syracuse, NY 13201 |
| 03588 | University of Minnesota Property Accounting | 2610 University Ave., St. Paul MN 55114 |
| 04713 | Motorola Semiconductor | 5005 East McDowell Rd., Phoenix, AZ 85008 |
| 05245 | Corcom Inc. | 2857 N. Halsted St., Chicago, IL 60657 |
| 06560 | Airco Speer Electronics Div. of Air Reduction Co. Inc. | P.O. Box 1692, Grand Plaza, 945 Grand Ave., Nogales, AZ 95621 |
| 07126 | Digitran | 855 S. Arroyo Parkway, Pasadena, CA 91105 |
| 07263 | Fairchild Camera and Instrument Corp., Semiconductor Div. | 313 Frontage Rd., Mountain View, CA 94040 |
| 08547 | Wallace RG Co., Inc. | 2301 E. Del Amo Blvd, Compton, CA 90220 |
| 09353 | C and K Components Inc. | 103 Morse, Newton, MA 02158 |
| 12014 | Chicago Rivet & Machine Co. | 950 S. 25th Ave., Bellwood, IL 60104 |
| 15933 | See 52542 | |
| 18324 | Signetics Corp. | 811 E Arques, Sunnyvale, CA 94086 |
| 21604 | Buckeye Stamping Co. | 555 Marion Rd., Columbus, OH 43207 |
| 23172 | See 92194 | |
| 23936 | William J. Purdy Co. Pamotor Div. | 770 Airport Blvd, Burlingame, CA 94010 |
| 27014 | National Semiconductor Corp. | 2950 San Ysidro Way, Santa Clara, CA 95051 |
| 28520 | Heyman Mfg. Co. | 147 N. Michigan Ave., Kenilworth, NJ 07033 |

TABLE 7.1 CODE-TO-NAME CROSS-REFERENCE (Cont'd)

| Code | Name | Address |
|---|---|---|
| 51495 | R & D Plastics | 780 32nd St., Richmond, CA 94804 |
| 52542 | Systron-Donner Corp. | 10 Systron Dr., Concord, CA 94518 |
| 56289 | Sprague Electronics Co. | North Adams, MA 01247 |
| 70903 | Belden Corp. | 415 S. Kilpatrick, Chicago, IL 60644 |
| 71279 | Cambridge Thermionic Corp. | 445 Concord Ave., Cambridge, MA 02138 |
| 71590 | Globe-Union Inc. Centralab Div. | P.O. Box 591, Milwaukee, WI 53201 |
| 71785 | Cinch Mfg. Co & Howard B. Jones Div. | 1026 S. Homan Ave., Chicago, IL 60640 |
| 72136 | Electro Motive Mfg. Co. Inc. | South Park & John Sts., Willimantic, CT 06226 |
| 72982 | Erie Technological Products Inc. | 644 W 12th St., Erie, PA 16512 |
| 73957 | Groov-Pin Corp. | 1125 Hendricks Causeway, Ridgefield, NJ 07657 |
| 75915 | Littlefuse Inc. | 800 E. Northwest Hwy., Des Plaines, IL 60016 |
| 78189 | Illinois Tool Works Inc. Shakeproof Div. | St. Charles Rd., Elgin, IL 60126 |
| 78290 | Struthers-Dunn Inc. | Lambs Road, Pitman, NJ 08071 |
| 78553 | Tinnerman Products Inc. | 8700 Brookpark Rd., Cleveland, OH 44129 |
| 79727 | Continental-Wirt Electronics Corp. | 26 W. Queen St., Philadelphia, PA 19144 |
| 81073 | Grayhill Inc. | 561 Hillgrove Ave., La Grange, IL 60525 |
| 82389 | Switchcraft Inc. | 555 N. Elston Ave., Chicago, IL 60630 |
| 83330 | Smith Herman H. Inc. | 812 Snediker Ave., Brooklyn, NY 11207 |
| 88245 | Litton Precision Products Inc. USECO, Div. Litton Industries | 13536 Saticoy St., Van Nuys, CA 91409 |
| 90201 | Mallory Capacitor Co. | 3029 E. Washington St., P.O. Box 372, Indianapolis, IN 46206 |

TABLE 7.1 CODE-TO-NAME CROSS-REFERENCE (Cont'd)

| Code | Name | Address |
|---|---|---|
| 91418 | Radio Materials Co. | 4242 W. Bryn Mawr, Chicago, IL 60646 |
| 92194 | Alpha Wire Corp. | 711 Lidgerwood Ave., Elizabeth NJ 07207 |
| 92702 | IMC Magnetics Corp. Eastman Division | 570 Main St., Westbury Long Island, NY 11591 |
| 99392 | STM Corp. | 2904 Chapman St., Oakland, CA 94601 |

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | ASSEMBLY, TEST | 52542 | 053b5908 | 05365908 | 1 |
| | | TRIM, END | 52542 | 03367401 | 03367401 | 4 |
| | | TRIM, SIDE | 52542 | C3356406 | 03356406 | 4 |
| | | TRIM, FRONT | 52542 | 033762 | 033762 | 2 |
| | | COVER, TOP | 52542 | 03376006 | 03376006 | 1 |
| | | COVER, BOTTOM | 52542 | 05386606 | 05386606 | 1 |
| | | COVER, SIDE | 52542 | 03356506 | 03356506 | 2 |
| | | HANDLE | 52542 | 03357006 | 03357006 | 2 |
| | | BAIL, LONG: Full Rack | 15933 | 32001-059 | 101058 | 1 |
| | | FEET, SET | 21604 | PP40012640013 | 101059 | 1 |
| | | TUBING, VINYL: BLACK | 23172 | PVC-105/16-2 | 100955 | A/R |
| | | SCREW, PAN HEAD MACHINE: 4-40 x 1/4 | MIL | MS51957-13 | 10062604 | 6 |
| | | SCREW, PAN HEAD MACHINE: 6-32 x 1/4 | MIL | MS51957-26 | 10063204 | 12 |
| | | SCREW, FLAT HEAD MACHINE: 6-32 x 1/2 | MIL | MS51957-30 | 10063208 | 6 |
| | | SCREW, FLAT HEAD MACHINE: 6-32 x 5/16 | MIL | MS24693-C25 | 10073105 | 4 |
| | | SCREW, FLAT HEAD MACHINE: 8-32 x 1/2 | MIL | MS24693-C50 | 10074308 | 4 |
| | | SCREW, FLAT HEAD MACHINE: 8-32 x 5/8 | MIL | MS24693-C51 | 10074310 | 4 |
| | | SCREW, FLAT HEAD MACHINE: 8-32 x 1/4 | MIL | MS24693-C46 | 10074304 | 2 |
| | | SCREW, FLAT HEAD MACHINE: 8-32 x 3/8 | MIL | MS24693-C48 | 10074306 | 2 |
| | | SCREW, PAN HEAD MACHINE: 8-32 x 1/4 | MIL | MS51957-41 | 10064204 | 4 |
| | | SCREW, PAN HEAD MACHINE: 8-32 x 3/8 | MIL | MS51957-43 | 10064206 | 4 |
| | | NUT, TINNERMAN: 6-32 | 78553 | C880-632-24 | 100959 | 4 |
| | | NUT, SPEED: 6-32 | 78553 | C7494-632-4 | 102907 | 6 |
| | | WASHER: #4 flat | MIL | MS15795-803 | 100703 | 6 |
| | | LOCK: #4, split | MIL | MS35338-135 | 100711 | 6 |
| | | LOCK: #6, split | MIL | MS35338-136 | 100712 | 12 |
| | | LOCK: #8, split | MIL | MS35338-137 | 100713 | 8 |
| | | CORD, LINE | 70903 | BR-1736 | 102407 | 1 |
| | | Test Assembly #05365908 | | | | |
| 1 | | ASSEMBLY, REAR PANEL | 52542 | 05366102 | 05366102 | 1 |
| 2 | | ASSEMBLY, FRONT PANEL | 52542 | 05366005 | 05366005 | 1 |
| 3 | | CARD CAGE | 52542 | 053663 | 053663 | 1 |
| 4 | | ASSEMBLY, POWER SUPPLY CHASSIS | 52542 | 05366402 | 05366402 | 1 |
| 5 | | GUSSET | 52542 | 053665 | 053665 | 2 |
| 6 | | CARD GUIDE, MODEL 600A | 52542 | 053666 | 053666 | 16 |
| 7 | | CONNECTOR, P.C. EDGE: 22 Position Dual Lug | 71785 | 251-22-30-161 | 101167 | 16 |
| 8 | A6 | ASSEMBLY, P.C. EXTENDER | 52542 | 05376101 | 05376101 | 1 |
| 9 | A10 | ASSEMBLY, P.C. 10ns CHANNEL 1 | 52542 | 05371001 | 05371001 | 1 |
| 10 | A15 | ASSEMBLY, P.C. OUTPUT BUFFER | 52542 | 05371901 | 05371901 | 1 |
| 11 | A16 | CONTROL, 10ns | 52542 | 05371201 | 05371201 | 1 |
| 12 | | SCREW, PAN HEAD MACHINE: 6-32 x 5/16 | MIL | MS51957-27 | 10063205 | 19 |
| 13 | | WASHER: #6 splitlock | MIL | MS35338-136 | 100712 | 18 |
| 14 | | SCREW, PAN HEAD MACHINE: 8-32 x 3/8 | MIL | MS51957-43 | 10064206 | 8 |
| 15 | | WASHER: #8 splitlock | MIL | MS35338-136 | 100713 | 8 |
| 16 | | SCREW, FLAT HEAD MACHINE: 8-32 x 5/16 | MIL | MS24693-C47 | 10074305 | 4 |
| 17 | | SCREW, PAN HEAD MACHINE: 4-40 x 9/16 | 08547 | BY DESCRIPTION | 100835 | 32 |
| 18 | | WASHER: #4 flat | MIL | MS15795-803 | 100703 | 32 |

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | Test Assembly #05365908 (Cont'd) | | | | |
| 19 | | NUT: 4-40 kep | 78189 | 511-041800-00 | 100941 | 32 |
| 20 | | NOT USED | | | | |
| 21 | | NUT: 5-32 kep | 78189 | 511-061800-00 | 100862 | 2 |
| 22 | | WASHER: #6 flat | MIL | MS15795-805 | 100704 | A/R |
| 23 | | SCREW, PAN HEAD MACHINE: 6-32 x 7/16 | MIL | MS51957-29 | 10063207 | 1 |
| 24 | | ASSEMBLY, FRONT PANEL 602 | 52542 | 05366006 | 05366006 | 1 |
| 25 | A4 | ASSEMBLY, P.C. MULTIPLIER: 100 MHz | 52542 | 05371401 | 05371401 | 1 |
| 26 | | Same As A10 | | | | |
| 27 | | Same As A10 | | | | |
| 28 | | Same As A10 | | | | |
| 29 | | ASSEMBLY, FRONT PANEL 603 | 52542 | 05366007 | 05366007 | 1 |
| 30 | | ASSEMBLY, FRONT PANEL 604 | 52542 | 05366008 | 05366008 | 1 |
| 31 | | EXTRACTOR, HOT STAMPED A10 | 52542 | 03948210 | 03948210 | 1 |
| 32 | | EXTRACTOR, HOT STAMPED A13 | 52542 | 03948213 | 03948213 | 1 |
| 33 | | EXTRACTOR, HOT STAMPED A17 | 52542 | 03948217 | 03948217 | 1 |
| 34 | | EXTRACTOR, HOT STAMPED A19 | 52542 | 03948219 | 03948219 | 1 |
| 35 | | PIN, SPRING .094D x .250L | 73947 | 50-094-0250 | 100752 | 4 |
| 36 | R3 | RESISTOR, 24 k 5% 1/4w | 01121 | CB4715 | 101625 | 1 |
| | | Extender Board Assembly #05376101 | | | | |
| | J1,J2 | CONNECTOR, PC EDGE: 22 Position Dual Lug | 71785 | 251-22-30-161 | 101167 | 2 |
| | | Power Supply Chassis Assembly #05366402 | | | | |
| 1 | | POWER SUPPLY CHASSIS | 52542 | 053664 | 053664 | 1 |
| 2 | C1,C5 | CAPACITOR, ELECTROLYTIC CAN: 31,000µf 15v | 99392 | 91C15JC3135 | 103065 | 2 |
| 3 | | KIT, MTG for TRANSISTOR | 04713 | MK-15 | 100689 | 5 |
| 4 | CR1,CR2-CR5,CR6 | DIODE, RECTIFIER: 20 v | 04713 | MBR1520 w/MH745 | 103066 | 4 |
| 5 | U1 | TRANSISTOR, SILICON NPN: 60v | 07126 | MJ2500 | 102889 | 1 |
| 6 | U2 | INTEGRATED CIRCUIT, VOLTAGE REGULATOR: 5v 20w | 27014 | LM309K | 025787 | 1 |
| 7 | R1,R2 | RESISTOR, POWER 2Ω 5% 2w | 56289 | 240E2R05 | 101772 | 2 |
| 8 | C2,C6,C7 | CAPACITOR, TANT: 100µf 20v 10% | 07126 | 150D107X902052 | 100208 | 3 |
| 9 | | CLAMP, CAPACITOR: 2" | 90201 | VR8 | 106879 | 2 |
| 10 | | SCREW, PAN HEAD MACHINE: 6-32 x 5/16 | MIL | MS51957-27 | 10063205 | 6 |
| 11 | | NUT: 6-32 kep | 78189 | 511-061800-00 | 100862 | 7 |
| 12 | | SCREW, PAN HEAD MACHINE: 4-40 x 5/16 | MIL | MS51957-14 | 10062605 | 8 |
| 13 | | WASHER: #4 splitlock | MIL | MS35338-135 | 100711 | 10 |
| 14 | | WASHER: #4 flat | MIL | MS15795-803 | 100703 | 10 |
| 15 | | NUT: 4-40 hex | MIL | MS35649-244 | 100707 | 10 |
| 16 | | SCREW, PAN HEAD MACHINE: 8-32 x 1/2 | MIL | MS51957-45 | 10064208 | 2 |
| 17 | | NUT: 8-32 kep | 78189 | 511-081800-00 | 100940 | 2 |
| 18 | | LUG, SOLDER: Internal Tooth #10, 2 holes | 78189 | 2104-10-00 | 100989 | 8 |
| 19 | | SCREW, PAN HEAD MACHINE: 10-32 x 3/8 | MIL | MS51958-61 | 10064406 | 6 |
| 20 | | GROMMET, 3/8 MTG 1/4ID Black nylon | 28520 | SB-375-4 | 100781 | 4 |

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | Power Supply Chassis Assembly #05366402 (Cont'd) | | | | |
| 21 | U3 | INTEGRATED CIRCUIT, VOLTAGE REGULATOR: 15v 5% | 07263 | 7815KC | 045282 | REF |
| 22 | U4 | INTEGRATED CIRCUIT, VOLTAGE REGULATOR: 2v 5% 15w | 04713 | MC7902CK | 103067 | 1 |
| 23 | U5 | TRANSISTOR, SILICON NP 60v | 04713 | MJ3000 | 103068 | 1 |
| 24 | U6 | INTEGRATED CIRCUIT, VOLTAGE REGULATOR: 5.2v 5% | 27014 | LM320K-5.2 | 103064 | 1 |
| 25 | C3 | CAPACITOR, ELECTROLYTIC CAN: 2700µf 25v 10% | 56289 | 36D272G025AA2A | 100232 | REF |
| 26 | CR3,CR4 | DIODE, RECTIFIER: 600v | 04713 | IN4005 | 100413 | REF |
| 27 | | CLAMP, CAPACITOR: 1 3/8" | 56289 | CM5-22 | 100725 | REF |
| 28 | | TERMINAL, SCREW: #6-32, 1/4 hex | 71279 | 2432-2 | 102752 | REF |
| 29 | | SCREW, PAN HEAD MACHINE: 4-40 x 7/16 | MIL | MS51957-16 | 10062607 | 2 |
| 30 | | HEATSINK | 52542 | 053853 | 053853 | 1 |
| | | Front Panel Assembly #05366008 | | | | |
| 1 | | PANEL, SUB-FRONT | 52542 | 053660 | 053660 | 1 |
| 2 | | PANEL, DECORATIVE | 52542 | 05366201 | 05366201 | 1 |
| 3 | S7,S8,S9, S10 | ASSEMBLY, PUSHBUTTON SWITCH: 5 Station | 52542 | 045821 | 045821 | 4 |
| 4 | | BRACKET, SWITCH MTG | 52542 | 053669 | 053669 | 4 |
| 5 | S1,S3 | SWITCH, TOGGLE, SPDT, BLACK FLAT BAT | 09353 | 7101PN+DRESSNUT | 102346 | 2 |
| 6 | S4 | SWITCH, PUSHBUTTON: Single Black | 81073 | 30-3 w/DRESSNUT | 102347 | 1 |
| 7 | S5 | SWITCH, PUSHBUTTON: Single Red | 81073 | 30-1 | 102313 | 1 |
| 8 | SEP P/L | SWITCH, THUMBWHEEL: BCD w/DIODES | 52542 | 05130005 | 05130005 | 32 |
| 9 | | BRACKET, SWITCH: End Mount Black Matte | 07126 | DIGITRAN | 102359 | 4 |
| 10 | S11,21,31 41 | SPACER, SWITCH: .35" Black Matte | 07126 | 29-1004/B | 102358 | 4 |
| 11 | | STRAPS, PAIR: Switch Mounting | 07126 | 29-57-001-9 | 10236709 | 4 |
| 12 | S18,S28, S38,S48 | SWITCH, THUMBWHEEL: Decimal Marking | 52542 | 051374 | 051374 | REF |
| 13 | DS1 | LIGHT EMITTING DIODE: w/PANEL CLIP | 07126 | HPA 5082-4440 | 100456 | 1 |
| 14 | | PANEL, DECORATIVE | 52542 | 05366202 | 05366202 | 1 |
| 15 | | NUT, DRESS: 1/4-32 | 81073 | 30C1023 | 100920 | 2 |
| 16 | | SCREW, PAN HEAD MACHINE: 2-56 x 3/16 | MIL | MS51957-2 | 10062503 | 8 |
| 17 | | SCREW, PAN HEAD MACHINE: 2-56 x 5/16 | MIL | MS51957-4 | 10062505 | 16 |
| 18 | | WASHER: #2 flat | MIL | MS15795-802 | 100614 | 16 |
| 19 | | WASHER: #2 splitlock | MIL | MS35337-77 | 100661 | 8 |
| 20 | | PANEL, DECORATIVE | 52542 | 05366203 | 05366203 | 1 |
| 21 | | SCREW, FLAT HEAD MACHINE: 4-40 x 5/16 | MIL | MS24693-C3 | 10072005 | |
| 22 | | WASHER: #4 splitlock | MIL | MS35338-135 | 100711 | 8 |
| 23 | | NUT: #4 hex | MIL | NAS671C4 | 100622 | 8 |
| 24 | J2,J11 | RECEPT, RIGHT FRONT BNC | MIL | UC-1094A/U | 101170 | 10 |
| 25 | | LUG, SOLDER | 83330 | 1497 | 100495 | 10 |
| 26 | | PANEL, DECORATIVE | 52542 | 05366204 | 05366204 | 1 |

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | Thumbwheel Switch Assembly #05130005 | | | | |
| | | SWITCH, THUMBWHEEL BCD w/DIODE | 07126 | 29015/B | 102356 | 1 |
| | | DIODE, SIGNAL: 50v | 03588 | IN4151 | 100385 | 4 |
| | | Rear Panel Assembly #05366102 | | | | |
| 1 | | REAR PANEL | 52542 | 053661 | 053661 | 1 |
| 2 | B1 | FAN: 50-60 Hz | 92702 | PWS2107F-M | 100038 | 1 |
| 3 | | GUARD, FINGER for 3.12 Sq Fan | 23936 | 5508 | 100886 | 1 |
| 4 | | FILTER BRACKET | 52542 | 039391 | 039391 | 1 |
| 5 | | AIR FILTER | 52542 | 039410 | 039410 | 1 |
| 6 | | SPACER, SWAGE: 6-32 x 1/4 | 88245 | 1530 B 1/4 | 100783 | 1 |
| 7 | T1 | TRANSFORMER | 52542 | 053631 | 053631 | 1 |
| 8 | | MOD. END BELL | 52542 | 053705 | 053705 | 1 |
| 9 | XF1 | FUSE POST | 75915 | 342004 | 102409 | 1 |
| 10 | F1 | FUSE, SLO BLO: 1.5A 125v | 75915 | 31301-5 | 100591 | |
| 11 | FL1 | IEC RECEPTICLE, FILTER: 250v | 05245 | 3EF1 | 102461 | 1 |
| 12 | S6 | SLIDE SWITCH: 115-230 | 79727 | GF-124-SPDT | 102630 | 1 |
| 13 | S2 | SWITCH, SLIDE 4 PDT | 82389 | 47227LF | 102329 | 1 |
| 14 | J1,J12 | RECEPTICLE, RF BNC: Front Mounted | MIL | UG-1094/U | 101155 | 2 |
| 15 | | BUT, PLUG | 83330 | 652 | 100840 | 10 |
| 16 | | LUG, SOLDER: .375 Mounting 1 hole | 83330 | 1497 | 100495 | 2 |
| 17 | | TRANSFORMER | 52542 | 053668 | 053668 | 1 |
| 18 | | SCREW, PAN HEAD MACHINE: 2-56 x 5/16 | MIL | MS51957-4 | 10062505 | 8 |
| 19 | | WASHER: #2 flat | MIL | MS15795-802 | 100614 | 8 |
| 20 | | WASHER: #2 splitlock | MIL | MS35337-77 | 100661 | 8 |
| 21 | | SCREW, PAN HEAD MACHINE: 4-40 x 5/16 | MIL | MS51957-14 | 10062605 | 4 |
| 22 | | WASHER: #4 splitlock | MIL | MS35338-135 | 100711 | 4 |
| 23 | | NUT: #4 hex | MIL | | 100626 | 4 |
| 24 | | NUT: #6 hex | MIL | NAS671C6 | 100638 | 4 |
| 25 | | WASHER: #6 splitlock | MIL | MS35338-136 | 100712 | 5 |
| 26 | | RIVET, SEMTUB: .088 x .125 | 12014 | R-3484X1/8 | 100924 | 2 |
| 27 | | SCREW, PAN HEAD MACHINE: 6-32 x 5/16 | MIL | MS51957-27 | 10063205 | 1 |
| 28 | | COVER PLATE, 50 pin | 52542 | 03139411 | 03139411 | 4 |
| 29 | | COVER PLATE | 52542 | 053766 | 053766 | 1 |
| 30 | | NUT: 4-40 kep | 78189 | 511-041800-00 | 100941 | 2 |
| 31 | | WASHER: #4 flat | MIL | MS15795-803 | 100703 | 2 |
| 32 | | SCREW, PAN HEAD MACHINE: 4-40 x 3/8 | MIL | MS15957-28 | 10064206 | 2 |
| 33 | | STIFFENER | 52542 | 053706 | 053706 | 1 |
| | | 100 MHz Multiplier Assembly #05371401 | | | | |
| | C1 | CAPACITOR, VARIABLE, CERAMIC: 15-60pF | 72982 | 538-006,F15-60 | 106502 | 2 |
| | C2 | Same as C1 | | | | |
| | C3 | CAPACITOR, MOLD, CERAMIC: .001 µf 50 V 20% | 71590 | CW5C102M | 100251 | 3 |
| | C4 | Same as C3 | | | | |
| | C5 | Same as C3 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | 100 MHz Multiplier Assembly #05371401 (Cont'd) | | | | |
| | C6 | CAPACITOR, DISC MICA: 150 pF, 500 V 5% | 72136 | DM15F0151J0 | 10021901 | 1 |
| | C7 | Same as C4 | | | | |
| | C8 | CAPACITOR, DISC MICA: 100 pF, 500 V 5% CRIMP LEAD | 72136 | DM15FD101J0 | 10017301 | 1 |
| | C9 | Same as C3 | | | | |
| | C10 | CAPACITOR, DISC CERAMIC: .01 µf, 100V +80-20% | 91418 | TA110 | 100103 | 11 |
| | C11 | Same as C10 | | | | |
| | C12 | Same as C10 | | | | |
| | C13 | Same as C10 | | | | |
| | C14 | Same as C10 | | | | |
| | C15 | CAPACITOR, EL AX: 100 µf, 25 V +75-10% | 56289 | TE1211 | 100165 | 3 |
| | C16 | Same as C10 | | | | |
| | C17 | Same as C10 | | | | |
| | C18 | Same as C10 | | | | |
| | C19 | Same as C10 | | | | |
| | C20 | Same as C10 | | | | |
| | C21 | Same as C10 | | | | |
| | C22 | Same as C15 | | | | |
| | C23 | CAPACITOR, DISC CERAMIC: .05 µf, 10 V +10-20% | 71590 | UK10-503 | 100122 | 1 |
| | C24 | Same as C15 | | | | |
| | L1 | INDUCTOR, FIXED: .05 µh, 10% | 06560 | 10150-17K | 101323 | 3 |
| | L2 | Same as L1 | | | | |
| | L3 | Same as L1 | | | | |
| | Q1 | TRANSISTOR, | | | 106591 | 2 |
| | Q2 | Same as Q1 | | | | |
| | R1 | RESISTOR, COMP: 1K 5%, 1/4w | 01121 | CB1025 | 101569 | 4 |
| | R2 | Same as R1 | | | | |
| | R3 | Same as R1 | | | | |
| | R4 | Same as R1 | | | | |
| | R5 | RESISTOR, COMP: 2.2K 5%, 1/4w | 01121 | CB2225 | 101562 | 8 |
| | R6 | Same as R5 | | | | |
| | R7 | Same as R5 | | | | |
| | R8 | Same as R5 | | | | |
| | R9 | Same as R5 | | | | |
| | R10 | Same as R5 | | | | |
| | R11 | Same as R5 | | | | |
| | R12 | Same as R5 | | | | |
| | R13 | RESISTOR, COMP: 100 Ω 5%, 1/4w | 01121 | CB1015 | 101609 | 4 |
| | R14 | Same as R13 | | | | |
| | R15 | Same as R13 | | | | |
| | R16 | NOT USED | | | | |
| | R17 | RESISTOR, COMP: 150 Ω 5%, 1/4w | 01121 | CB1515 | 101615 | 3 |
| | R18 | Same as R17 | | | | |
| | R19 | RESISTOR, COMP: 330 Ω 5%, 1/4w | 01121 | CB3315 | 101536 | 1 |
| | R20 | RESISTOR, COMP: 220 Ω 5%, 1/4w | 01121 | CB2215 | 101566 | 1 |
| | R21 | Same as R17 | | | | |
| | R22 | Same as R13 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | 100 MHz Multiplier Assembly #05371401 (Cont'd) | | | | |
| | R23 | RESISTOR, COMP: 47 Ω 5%, 1/4w | 01121 | CB4705 | 101560 | 1 |
| | R24 | RESISTOR, COMP: 10 Ω 5%, 1/4w | 01121 | CB1005 | 101557 | 1 |
| | R25 | RESISTOR, COMP: 4.7K 5%, 1/4w | 01121 | CB4725 | 101598 | 1 |
| | R26 | RESISTOR, COMP: 51 Ω 5%, 1/4w | 01121 | CB5105 | 101672 | 1 |
| | U1 | INTEGRATED CIRCUIT, QUAD TTL/ECL TRANSLATOR | 04713 | MC10124L | 045228 | 1 |
| | U2 | INTEGRATED CIRCUIT, ECL QUAD 2-input NOR gates | 04713 | MC10102P | 103025 | 2 |
| | U3 | Same as U2 | | | | |
| | U4 | INTEGRATED CIRCUIT, ECL-SSI Triple Line Receiver | 04713 | MC10216L | 045276 | 1 |
| | U5 | INTEGRATED CIRCUIT, TTL-SSI QUAD 2-input NOR gates | 04713 | MC3002P | 025739 | 1 |
| | U6 | INTEGRATED CIRCUIT, TTL-SSI QUAD 2-input NAND gates | 01295 | SN74S00N | 025785 | 1 |
| | | EXTRACTOR, HOT STAMP A4 | 52542 | 03948204 | 03948204 | 1 |
| | | EXTRACTOR, P.C. 1/16 MAT | 51495 | 1743 | 100865 | 2 |
| | | ROLL PIN | 73957 | 50-094-0250 | 100752 | 2 |
| | | 10ns Channel Assembly #05371001 | | | | |
| | | *NOTE* *A10, A13, A17, and A19 are identical.* | | | | |
| | C1 | CAPACITOR, DISC MICA: 100 pf 500 V, 5% crimp lead | 72136 | DM15FD10J0 | 10017301 | 1 |
| | C2 | CAPACITOR, DISC CERAMIC: .05 µf 10 V +80-20% | 71590 | UK10-503 | 100122 | 14 |
| | C3 | Same as C2 | | | | |
| | C4 | Same as C2 | | | | |
| | C5 | Same as C2 | | | | |
| | C6 | Same as C2 | | | | |
| | C7 | CAPACITOR, EL AX: 100 µf 25 V +75-10% | 56289 | TE1211 | 100165 | 3 |
| | C8 | Same as C2 | | | | |
| | C9 | Same as C2 | | | | |
| | C10 | Same as C2 | | | | |
| | C11 | Same as C2 | | | | |
| | C12 | Same as C2 | | | | |
| | C13 | Same as C2 | | | | |
| | C14 | Same as C2 | | | | |
| | C15 | Same as C2 | | | | |
| | C16 | Same as C2 | | | | |
| | C17 | CAPACITOR, DISC CERAMIC: .01 µf 100 V +80-20% | 9..418 | TA110 | 100103 | 13 |
| | C18 | Same as C17 | | | | |
| | C19 | Same as C17 | | | | |
| | C20 | Same as C17 | | | | |
| | C21 | Same as C17 | | | | |
| | C22 | Same as C7 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION _Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | 10ns Channel Assembly #05371001 (Cont'd) | | | | |
| | C23 | Same as C17 | | | | |
| | C24 | Same as C17 | | | | |
| | C25 | Same as C17 | | | | |
| | C26 | Same as C17 | | | | |
| | C27 | Same as C17 | | | | |
| | C28 | Same as C17 | | | | |
| | C29 | Same as C17 | | | | |
| | C30 | Same as C17 | | | | |
| | C31 | Same as C7 | | | | |
| | CR1 | DIODE, SIGNAL: 50 V | 03508 | IN4151 | 100385 | 4 |
| | CR2 | Same as CR1 | | | | |
| | CR3 | Same as CR1 | | | | |
| | CR4 | Same as CR1 | | | | |
| | Q1 | TRANSISTOR, SILICON PNP | 07263 | 2N3646 | 101369 | 4 |
| | Q2 | Same as Q1 | | | | |
| | Q3 | Same as Q1 | | | | |
| | Q4 | Same as Q1 | | | | |
| | R1 | RESISTOR, COMP: 4.7 K 5%, 1/4w | 01121 | CB4725 | 101598 | 10 |
| | R2 | RESISTOR, COMP: 22 K 5%, 1/4w | 01121 | CB2235 | 101572 | 4 |
| | R3 | RESISTOR, COMP: 1 K 5%, 1/4w | 01121 | CB1025 | 101569 | 5 |
| | R4 | Same as R1 | | | | |
| | R5 | Same as R2 | | | | |
| | R6 | Same as R3 | | | | |
| | R7 | Same as R1 | | | | |
| | R8 | Same as R2 | | | | |
| | R9 | Same as R3 | | | | |
| | R10 | Same as R1 | | | | |
| | R11 | Same as R2 | | | | |
| | R12 | Same as R3 | | | | |
| | R13 | RESISTOR, COMP: 220 Ω 5%, 1/4w | 01121 | CB2215 | 101566 | 9 |
| | R14 | Same as R13 | | | | |
| | R15 | Same as R13 | | | | |
| | R16 | RESISTOR, COMP: 51 Ω 5%, 1/4w | 01121 | CB5105 | 101672 | 6 |
| | R17 | Same as R1 | | | | |
| | R18 | RESISTOR, COMP: 2.2K 5%, 1/4w | 01121 | CB2225 | 101562 | 7 |
| | R19 | Same as R3 | | | | |
| | R20 | Same as R1 | | | | |
| | R21 | Same as R18 | | | | |
| | R22 | Same as R1 | | | | |
| | R23 | Same as R13 | | | | |
| | R24 | Same as R16 | | | | |
| | R27 | Same as R18 | | | | |
| | R28 | Same as R13 | | | | |
| | R29 | Same as R13 | | | | |
| | R30 | Same as R1 | | | | |
| | R31 | Same as R1 | | | | |
| | R32 | Same as R16 | | | | |
| | R33 | Same as R13 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365S08 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | 10 ns Channel Assembly #05371001 (Cont'd) | | | | |
| | R34 | Same as R13 | | | | |
| | R35 | Same as R18 | | | | |
| | R36 | Same as R18 | | | | |
| | R37 | Same as R18 | | | | |
| | R38 | Same as R18 | | | | |
| | R39 | RESISTOR, COMP: 470 Ω 5%, 1/4w | 01121 | CB4715 | 101625 | 2 |
| | R40 | Same as R39 | | | | |
| | R41 | Same as R16 | | | | |
| | R42 | Same as R16 | | | | |
| | R43 | Same as R1 | | | | |
| | U1 | INTEGRATED CIRCUIT, TTL-SSI Dual 4-input NOR gate w/strobe | 01295 | SN7425N | 045296 | 4 |
| | U2 | Same as U1 | | | | |
| | U3 | INTEGRATED CIRCUIT, TTL-SSI 8-input NAND gate | 01295 | SN7430N | 025726 | 1 |
| | U4 | Same as U1 | | | | |
| | U5 | Same as U1 | | | | |
| | U6 | INTEGRATED CIRCUIT, TTL-SSI Hex inv 15 V open col | 01295 | SN7416N | 045230 | 1 |
| | U7 | INTEGRATED CIRCUIT, TTL-SSI Dual J-K Flip-Flop | 01295 | SN745112N | 025786 | 1 |
| | U8 | INTEGRATED CIRCUIT, TTL-SSI Quad 2-input NAND gate | 01295 | SN14500N | 025785 | 2 |
| | U9 | INTEGRATED CIRCUIT, TTL-SSI 4-2-3-2 AND-OR-INV | 01295 | SN74564N | 045222 | 1 |
| | U10 | INTEGRATED CIRCUIT, ECL Quad TTL/ECL Translator | 04713 | MC10124L | 045228 | 2 |
| | U11 | NOT USED | | | | |
| | U12 | INTEGRATED CIRCUIT, TTL-MSI UP/DOWN Decimal Counter | 01295 | SN74192N | SN74192N | 7 |
| | U13 | Same as U12 | | | | |
| | U14 | Same as U12 | | | | |
| | U15 | Same as U12 | | | | |
| | U16 | Same as U12 | | | | |
| | U17 | Same as U12 | | | | |
| | U18 | Same as U12 | | | | |
| | U19 | Same as U8 | | | | |
| | U20 | INTEGRATED CIRCUIT, Quad ECL/TTL Translator | 04713 | MC10125L | 045226 | 1 |
| | U21 | INTEGRATED CIRCUIT, ECL Dual 4-input OR/NOR gate | 04713 | MC10109P | 103026 | 1 |
| | U22 | INTEGRATED CIRCUIT, ECL Quad 2-input NOR gates | 04713 | MC1662L | 025778 | 1 |
| | U23 | INTEGRATED CIRCUIT, ECL Dual D M-S Flip-Flop | 04713 | MC10231L | 045227 | 2 |
| | U24 | NOT USED | | | | |
| | U25 | INTEGRATED CIRCUIT, TTL-MSI BINARY CNTR PAR SET | 18324 | N8281A | 025727 | 8 |
| | U26 | Same as U25 | | | | |
| | U27 | Same as U25 | | | | |
| | U28 | Same as U25 | | | | |
| | U29 | Same as U25 | | | | |

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | 10 ns Channel Assembly #05371001 (Cont'd) | | | | |
| | U30 | Same as U25 | | | | |
| | U31 | Same as U25 | | | | |
| | U32 | Same as U25 | | | | |
| | U33 | Same as U10 | | | | |
| | U34 | INTEGRATED CIRCUIT, ECL SYNC CNTR UP/ DOWN/P | 04713 | MC10137L | 103027 | 1 |
| | U35 | INTEGRATED CIRCUIT, ECL-SSI Triple Line Receiver | 04713 | MC10216L | 045276 | 1 |
| | | EXTRACTOR, P.C. | 51495 | 1743 | 100865 | 1 |
| | | ROLL PIN | 73957 | 50-094-0250 | 100752 | 1 |
| | | Output Buffer Assembly #05371902 | | | | |
| | C1 | CAPACITOR, DISC CERAMIC: .022 µf 25 V 20% | 71590 | 2DDU60E223M | 106483 | 16 |
| | C2 | CAPACITOR, DISC MICA: 22 pf 500 V 5% crimp lead | 72136 | DM15ED220J0 | 10006801 | 12 |
| | C3 | Same as C1 | | | | |
| | C4 | Same as C2 | | | | |
| | C5 | Same as C1 | | | | |
| | C6 | Same as C2 | | | | |
| | C7 | Same as C1 | | | | |
| | C8 | Same as C2 | | | | |
| | C9 | Same as C1 | | | | |
| | C10 | Same as C2 | | | | |
| | C11 | Same as C1 | | | | |
| | C12 | Same as C2 | | | | |
| | C13 | Same as C1 | | | | |
| | C14 | Same as C2 | | | | |
| | C15 | Same as C1 | | | | |
| | C16 | Same as C2 | | | | |
| | C17 | Same as C1 | | | | |
| | C18 | Same as C2 | | | | |
| | C19 | Same as C1 | | | | |
| | C20 | Same as C2 | | | | |
| | C21 | Same as C1 | | | | |
| | C22 | Same as C2 | | | | |
| | C23 | Same as C1 | | | | |
| | C24 | Same as C2 | | | | |
| | C25 | CAPACITOR, DISC MICA, 100pf 500 V 5% | 72136 | DM15FD101J0 | 100173 | 8 |
| | C26 | Same as C25 | | | | |
| | C27 | Same as C1 | | | | |
| | C28 | Same as C25 | | | | |
| | C29 | Same as C25 | | | | |
| | C30 | Same as C1 | | | | |
| | C31 | Same as C25 | | | | |
| | C32 | Same as C25 | | | | |
| | C33 | Same as C1 | | | | |
| | C34 | Same as C25 | | | | |

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | Output Buffer Assembly #05371902 (Cont'd) | | | | |
| | C35 | Same as C25 | | | | |
| | C36 | CAPACITOR, TANT 100 µf 10 V 20% | 56289 | 150D107X9010R2 | 100119 | 1 |
| | CR1 | DIODE, SIGNAL: 50 V | 03508 | IN4151 | 100385 | 6 |
| | CR2 | Same as CR1 | | | | |
| | CR3 | Same as CR1 | | | | |
| | CR4 | Same as CR1 | | | | |
| | CR5 | Same as CR1 | | | | |
| | CR6 | Same as CR1 | | | | |
| | CR7 | DIODE, RECTIFIER: 600 V | 04713 | IN4005 | 100413 | 1 |
| | Q1 | TRANSISTOR, SILICON NPN | 04713 | 2N3546 | 101362 | 10 |
| | Q2 | Same as Q1 | | | | |
| | Q3 | Same as Q1 | | | | |
| | Q4 | Same as Q1 | | | | |
| | Q5 | Same as Q1 | | | | |
| | Q6 | Same as Q1 | | | | |
| | Q7 | Same as Q1 | | | | |
| | Q8 | TRANSISTOR, SILICON NPN | 07263 | 2N4275 | 102716 | 4 |
| | Q9 | Same as Q1 | | | | |
| | Q10 | Same as Q8 | | | | |
| | Q11 | Same as Q1 | | | | |
| | Q12 | Same as Q8 | | | | |
| | Q13 | Same as Q1 | | | | |
| | Q14 | Same as Q8 | | | | |
| | Q15 | TRANSISTOR, SILICON NPN | 04713 | 2N5190 | 101394 | 2 |
| | Q16 | Same as Q15 | | | | |
| | R1 | RESISTOR, COMP: 220 Ω 5%, 1/4w | 01121 | CB2215 | 101566 | 20 |
| | R2 | Same as R1 | | | | |
| | R3 | RESISTOR, COMP: 100 Ω 5%, 1/2w | 01121 | EB3005 | 101498 | 28 |
| | R4 | Same as R3 | | | | |
| | R5 | RESISTOR, COMP: 18 Ω 5%, 1/4w | 01121 | CB1805 | 101727 | 6 |
| | R6 | Same as R1 | | | | |
| | R7 | Same as R1 | | | | |
| | R8 | Same as R3 | | | | |
| | R9 | Same as R3 | | | | |
| | R10 | Same as R5 | | | | |
| | R11 | Same as R1 | | | | |
| | R12 | Same as R1 | | | | |
| | R13 | Same as R3 | | | | |
| | R14 | Same as R3 | | | | |
| | R15 | Same as R5 | | | | |
| | R16 | Same as R1 | | | | |
| | R17 | Same as R1 | | | | |
| | R18 | Same as R3 | | | | |
| | R19 | Same as R3 | | | | |
| | R20 | Same as R5 | | | | |
| | R21 | Same as R1 | | | | |
| | R22 | Same as R1 | | | | |

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | Output Buffer Assembly #05371902 (Cont'd) | | | | |
| | R23 | Same as R3 | | | | |
| | R24 | Same as R3 | | | | |
| | R25 | Same as R5 | | | | |
| | R26 | Same as R1 | | | | |
| | R27 | Same as R1 | | | | |
| | R28 | Same as R3 | | | | |
| | R29 | Same as R3 | | | | |
| | R30 | Same as R5 | | | | |
| | R31 | Same as R1 | | | | |
| | R32 | RESISTOR, COMP: 75 Ω 5%, 1/4w | 01121 | CB7505 | 101737 | 4 |
| | R33 | Same as R3 | | | | |
| | R34 | Same as R3 | | | | |
| | R35 | Same as R3 | | | | |
| | R36 | Same as R3 | | | | |
| | R37 | Same as R1 | | | | |
| | R38 | Same as R1 | | | | |
| | R39 | Same as R32 | | | | |
| | R40 | Same as R3 | | | | |
| | R41 | Same as R3 | | | | |
| | R42 | Same as R3 | | | | |
| | R43 | Same as R3 | | | | |
| | R44 | Same as R1 | | | | |
| | R45 | Same as R1 | | | | |
| | R46 | Same as R32 | | | | |
| | R47 | Same as R3 | | | | |
| | R48 | Same as R3 | | | | |
| | R49 | Same as R3 | | | | |
| | R50 | Same as R3 | | | | |
| | R51 | Same as R1 | | | | |
| | R52 | Same as R1 | | | | |
| | R53 | Same as R32 | | | | |
| | R54 | Same as R3 | | | | |
| | R55 | Same as R3 | | | | |
| | R56 | Same as R3 | | | | |
| | R57 | Same as R3 | | | | |
| | R58 | Same as R1 | | | | |
| | R59 | RESISTOR, COMP: 470 Ω 5%, 1/4w | 01121 | CB4715 | 101623 | 2 |
| | R60 | Same as R59 | | | | |
| | R61 | RESISTOR, COMP: 1K 5%, 1/4w | 01121 | CB1025 | 101563 | 1 |
| | K1 | RELAY | 78290 | MRR1CDL | | 9 |
| | K2 | Same as K1 | | | | |
| | K3 | Same as K1 | | | | |
| | K4 | Same as K1 | | | | |
| | K5 | Same as K1 | | | | |
| | K6 | Same as K1 | | | | |
| | K7 | Same as K1 | | | | |
| | K8 | Same as K1 | | | | |

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | Output Buffer Assembly #05371902 (Cont'd) | | | | |
| | K9 | Same as K1 | | | | |
| | | EXTRACTOR, P.C. | 51495 | 1743 | 100865 | 2 |
| | | EXTRACTOR, HOT STAMP A15 | 52542 | 03984215 | 03984215 | 1 |
| | | ROLL PIN | 73957 | 50-094-0250 | 100752 | 2 |
| | | SWAGE, TERMINAL | 88245 | 2000B | 100482 | 6 |
| | | SCREW, PAN HEAD MACHINE: #4-40 x 5/16 | MIL | MS51957-14 | 10062605 | 2 |
| | | NUT, #4-40 hex | MIL | MS35649-244 | 100707 | 2 |
| | | 10ms Control Assembly #05371201 | | | | |
| | C1 | CAPACITOR, VARIABLE, CERAMIC: 9.0-35pf right angle PC mount | 72982 | 538-006D9.0-35 | 100159 | 1 |
| | C2 | CAPACITOR, VARIABLE, CERAMIC: 15-60pf | 72982 | 538-011F15-60 | 100234 | 1 |
| | C3 | CAPACITOR, DISC MICA: 560 pf 5% 300V crimp lead | 72136 | DM5FC561J0 | 10022201 | 1 |
| | C4 | CAPACITOR, DISC MICA: 100 pf 5% 500V crimp lead | 72136 | DM15FD101J0 | 10017301 | 2 |
| | C5 | CAPACITOR, DISC MICA; 47 pf 5% 500V crimp lead | 72136 | DM15ED470J0 | 10017101 | 1 |
| | C6 | CAPACITOR, DISC MICA: 33 pf 5% 500V crimp lead | 72136 | DM15ED330J0 | 10017501 | 1 |
| | C7 | CAPACITOR, DISC MICA: 68 pf 5% 500 V crimp lead | 72136 | DM15ED680J0 | 10023901 | 1 |
| | C8 | CAPACITOR, DISC CERAMIC: .01 µf 100V, +80-20% | 91418 | TA110 | 100103 | 13 |
| | C9 | CAPACITOR, DISC CERAMIC: .05 µf 10V, +80-20% | 71590 | UK10-503 | 100122 | 10 |
| | C10 | CAPACITOR, EL AX: 100 µf 25V +75-10% | 56289 | TE1211 | 100165 | 4 |
| | C11 | CAPACITOR, DISC MICA: 390 pf 5% 500V crimp lead | 72136 | DM15ED391J0 | 10017001 | 2 |
| | C12 | Same as C11 | | | | |
| | C13 | CAPACITOR, TANT: 2.2 µf 10% 20V | 56289 | 150D225X9020A2 | 100203 | 1 |
| | C14 | Same as C4 | | | | |
| | C15 | Same as C9 | | | | |
| | C16 | Same as C9 | | | | |
| | C17 | Same as C9 | | | | |
| | C18 | Same as C9 | | | | |
| | C19 | Same as C9 | | | | |
| | C20 | Same as C9 | | | | |
| | C21 | Same as C9 | | | | |
| | C22 | Same as C9 | | | | |
| | C23 | Same as C10 | | | | |
| | C24 | Same as C8 | | | | |
| | C25 | Same as C8 | | | | |
| | C26 | Same as C8 | | | | |
| | C27 | Same as C8 | | | | |
| | C28 | Same as C8 | | | | |
| | C29 | Same as C8 | | | | |
| | C30 | Same as C10 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | 10ns Control Assembly #05371201 (Cont'd) | | | | |
| | C31 | Same as C8 | | | | |
| | C32 | Same as C8 | | | | |
| | C33 | Same as C8 | | | | |
| | C34 | Same as C8 | | | | |
| | C35 | Same as C8 | | | | |
| | C36 | Same as C10 | | | | |
| | C37 | Same as C9 | | | | |
| | C38 | Same as C9 | | | | |
| | C39 | Same as C7 | | | | |
| | CR1 | DIODE, SIGNAL: 50V | 03508 | IN4151 | 100385 | 5 |
| | CR2 | Same as CR1 | | | | |
| | CR3 | Same as CR1 | | | | |
| | CR4 | Same as CR1 | | | | |
| | CR5 | Same as CR1 | | | | |
| | Q1 | TRANSISTOR, SILICON PNP | 07263 | 2N4275 | 102716 | 3 |
| | Q2 | Same as Q1 | | | | |
| | Q3 | Same as Q1 | | | | |
| | R1 | RESISTOR, COMP; 3.9K 5% 1/4w | 01121 | CB3925 | 101601 | 1 |
| | R2 | RESISTOR, COMP: 1K 5% 1/4w | 01121 | CB1025 | 101569 | 4 |
| | R3 | RESISTOR, COMP: 33K 5% 1/4w | 01121 | CB3335 | 101576 | 1 |
| | R4 | RESISTOR, COMP: 4.7K 5% 1/4w | 01121 | CB4725 | 101598 | 11 |
| | R5 | RESISTOR, COMP: 3.3K 5% 1/4w | 01121 | CB3325 | 101559 | 2 |
| | R6 | Same as R2 | | | | |
| | R7 | Same as R5 | | | | |
| | R8 | RESISTOR, COMP: 470 Ω 5% 1/4w | 01121 | CB4715 | 101625 | 3 |
| | R9 | RESISTOR, COMP: 100 Ω 5% 1/4w | 01121 | CB1015 | 101609 | 2 |
| | R10 | Same as R9 | | | | |
| | R11 | Same as R4 | | | | |
| | R12 | Same as R4 | | | | |
| | R13 | Same as R4 | | | | |
| | R14 | Same as R4 | | | | |
| | R15 | Same as R4 | | | | |
| | R16 | Same as R8 | | | | |
| | R17 | Same as R2 | | | | |
| | R18 | Same as R8 | | | | |
| | R19 | RESISTOR, COMP: 220 Ω 5% 1/4w | 01121 | CB2215 | 101566 | 1 |
| | R20 | RESISTOR, COMP: 51 Ω 5% 1/8w | 01121 | BB5105 | 101815 | 5 |
| | R21 | Same as R20 | | | | |
| | R22 | Same as R20 | | | | |
| | R23 | Same as R20 | | | | |
| | R24 | Same as R20 | | | | |
| | R25 | RESISTOR, COMP: 1K 5% 1/8w | 01121 | BB1025 | 101711 | 4 |
| | R26 | Same as R25 | | | | |
| | R27 | Same as R25 | | | | |
| | R28 | Same as R25 | | | | |
| | R29 | Same as R4 | | | | |
| | R30 | Same as R4 | | | | |
| | R31 | Same as R4 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | 10ns Control Assembly #05371201 (Cont'd) | | | | |
| | R32 | Same as R4 | | | | |
| | R33 | Same as R4 | | | | |
| | R34 | RESISTOR, COMP: 51 Ω 5% 1/4w | 01121 | CB5105 | 101672 | 5 |
| | R35 | Same as R34 | | | | |
| | R36 | Same as R2 | | | | |
| | R37 | RESISTOR, COMP: 15K 5% 1/4w | 01121 | CB1535 | 101552 | 1 |
| | R38 | Same as R34 | | | | |
| | R39 | Same as R34 | | | | |
| | R40 | Same as R34 | | | | |
| | U1 | INTEGRATED CIRCUIT, TTL-SSI Dual 2 wide AND-OR-1 | 01295 | SN74S51N | 045297 | 1 |
| | U2 | INTEGRATED CIRCUIT, TTL-SSI Quad 2-input NAND gates | 01295 | SN7400N | 019705 | 1 |
| | U3 | INTEGRATED CIRCUIT, TTL-MSI Decade Counter | 18324 | N8280A | 025722 | 2 |
| | U4 | Same as U3 | | | | |
| | U5 | INTEGRATED CIRCUIT, TTL-MSI BCD Decimal Decoder | 01295 | SN7442N | 025749 | 1 |
| | U6 | INTEGRATED CIRCUIT, TTL-SSI HEX INV 15V | 01295 | SN7416N | 045230 | 1 |
| | U7 | INTEGRATED CIRCUIT, ECL QUAD TTL-ECL Translator | 04713 | MC10124L | 045228 | 5 |
| | U8 | Same as U7 | | | | |
| | U9 | Same as U7 | | | | |
| | U10 | Same as U7 | | | | |
| | U11 | Same as U7 | | | | |
| | U12 | INTEGRATED CIRCUIT, TTL-SSI 4X2 input NAND gates | 01295 | SN74132N | 045270 | 1 |
| | U13 | INTEGRATED CIRCUIT, TTL-SSI 4-3 state BUS BFR | 01295 | SN74126N | 045298 | 5 |
| | U14 | Same as U13 | | | | |
| | U15 | Same as U13 | | | | |
| | U16 | Same as U13 | | | | |
| | U17 | Same as U13 | | | | |
| | U18 | INTEGRATED CIRCUIT, TTL-SSI Dual J-K Flip-Flop | 01295 | SN74S112 | 025736 | 1 |
| | U19 | INTEGRATED CIRCUIT, TTL-SSI Quad 2-input NAND gate | 01295 | SN74S00N | 025735 | 1 |
| | U20 | INTEGRATED CIRCUIT, ECL Quad ECL-TTL Translator | 04713 | MC10125L | 045226 | 1 |
| | U21 | INTEGRATED CIRCUIT, ECL Quad 2-input NOR gates | 04713 | MC1662L | 025778 | 5 |
| | U22 | INTEGRATED CIRCUIT, ECL Dual D MS Flip-Flop | 04713 | MC10231L | 045227 | 1 |
| | U23 | Same as U21 | | | | |
| | U24 | Same as U21 | | | | |
| | U25 | Same as U21 | | | | |
| | U26 | Same as U21 | | | | |
| | U27 | RESISTOR, MODULE, COMP: 4-5 k 20% .1w | 52542 | 027867 | 027867 | 10 |
| | U28 | Same as U27 | | | | |
| | U29 | Same as U27 | | | | |
| | U30 | Same as U27 | | | | |
| | U31 | Same as U27 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Final Assembly #05365808 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | 10ns Control Assembly #05371206 (Cont'd) | | | | |
| | U32 | Same as U27 | | | | |
| | U33 | Same as U27 | | | | |
| | U34 | Same as U27 | | | | |
| | U35 | Same as U27 | | | | |
| | U36 | Same as U27 | | | | |
| | W1 | JUMPER, MOLDED | GETTIG | L-2007-1 | 102879 | 1 |
| | | EXTRACTOR, HOT STAMPED A16 | 52542 | 03984216 | 03984216 | 1 |
| | | EXTRACTOR, P.C. 1/16 MAT | 51495 | 1743 | 100865 | 2 |
| | | ROLL PIN | 73957 | 50-094-0250 | 100752 | 2 |
| | Y1 | CRYSTAL, 10.0 MHz | 52542 | 039483 | 039483 | 1 |

# CHAPTER 8
# STANDARD OPTIONS

## 8.1 INTRODUCTION

This chapter contains the circuit descriptions, assembly/schematic drawings and replaceable parts lists for the standard options available with this instrument. The options are arranged in a numerical sequence in package format. The circuit description, followed by assembly/schematic drawings and the parts list. Where options are similar, the description, drawings, and parts lists are combined in a single package.

# TRIGGERED TIME BASE
# OPTION 02
# SCHEMATIC #7-05371501

## 1.1 INTRODUCTION

Installation of the triggered time base assembly, Option 02, reduces the period of indeterminancy to less than 1 ns. The 100 MHz time base is doubled, and, through delay lines, split into five channels with a 1 ns phase difference in each channel. Selection of the output channel is controlled by the trigger input. The selected channel is then divided-by-two, and the output is 100 MHz phased to the trigger.

## 1.2 CIRCUIT DESCRIPTION

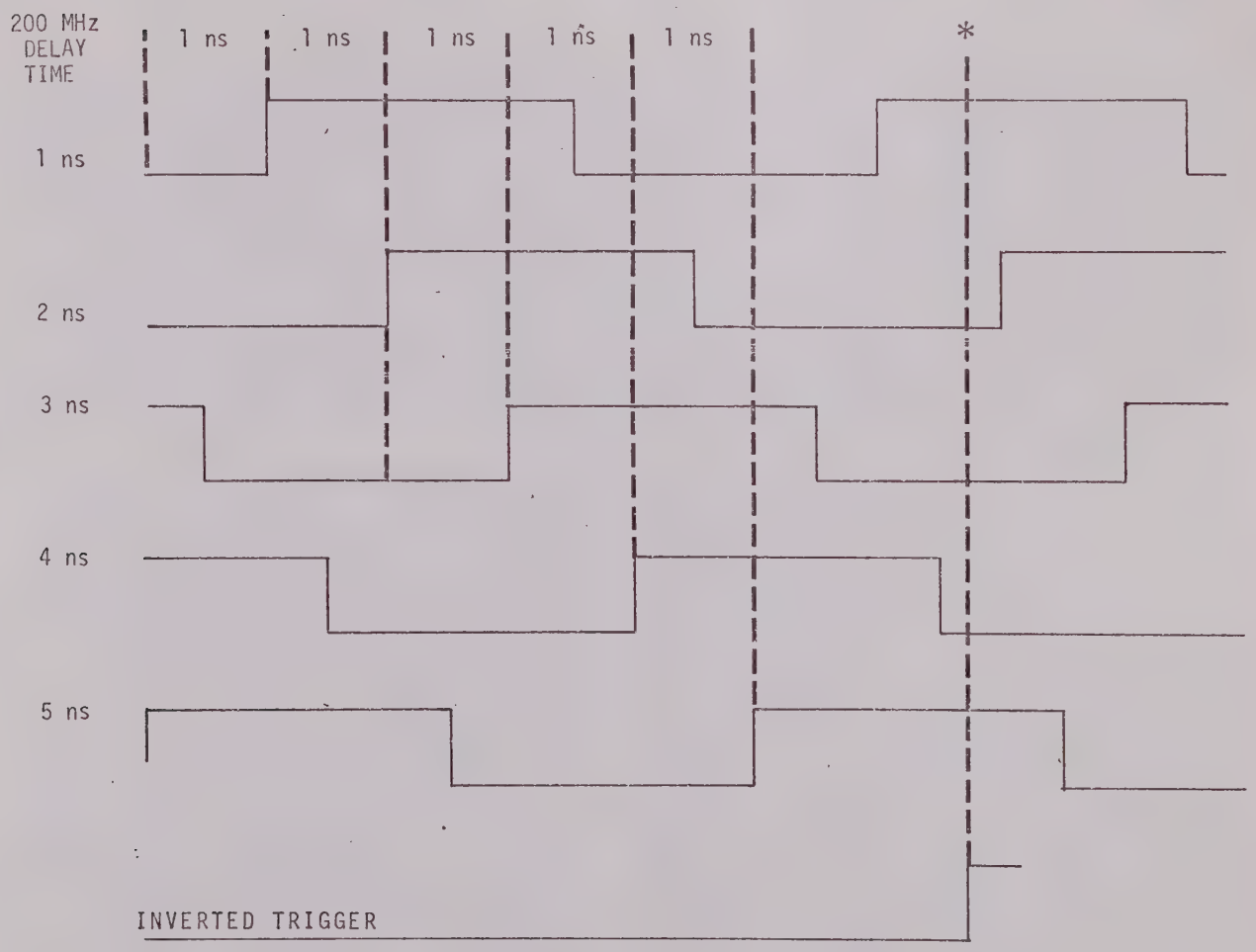
The 100 MHz from the time base expander is applied through amplifier, Q1/Q2, to the frequency multiplier L1, C2, C3. The output is coupled to the base of Q3 to drive L3, C5, C6. The 200 MHz output of amplifier Q4 is routed through delay lines, DL1, DL2, DL3, DL4, and DL5, to provide five channels of 200 MHz pulses with a phase differential of 1 ns between each succeeding channel. In each channel, the signal is applied to the D input of a master-slave D type flip-flop, which is the first in a series of three D type flip-flops. Output from each channel is through an OR gate selector matrix. The 200 MHz is also routed around the flip-flop directly to the channel output gate. Figure 02.1, Delay Channel Timing, shows the delay timing and phasing of the 200 MHz signal.

The trigger, from the control assembly, is applied to differential amplifier U5. The low output is routed through a series of OR/NOR gates for delay purposes, approximately 2 ns delay per gate. The high output, U5-7, is applied through U6 as a clock pulse to U9, U11, U13, U15, and U17. Each succeeding flip-flop in the time base channels is clocked by an output from the trigger chain, at approximately 12 ns displacement as the trigger moves down the delay chain.

Determination of the time base channel selected is a function of the trigger from control. Figure 02.1 shows the trigger imposed on the time base channels at an arbitrary time. At this time the 1 ns channel is high, 2 ns low, 3 ns low, 4 ns low and 5 ns high. The high clock transition from U5-7 through U5-14, 13, 12, is applied to the clock inputs of U9, U11, U13, U15, and U17. During this transition, the state at the D input, high or low, is transferred to the Q output. While the clock input remains high the flip-flop is disabled and it will remain in the selected state when the clock input returns to the low state. The outputs of the flip-flops will be the same level as the time base inputs were at the time of the positive transition. Approximately 12 ns later U8 is clocked by a positive transition. Once again, the information at the D input will be transferred to the output and will change only on another positive transition

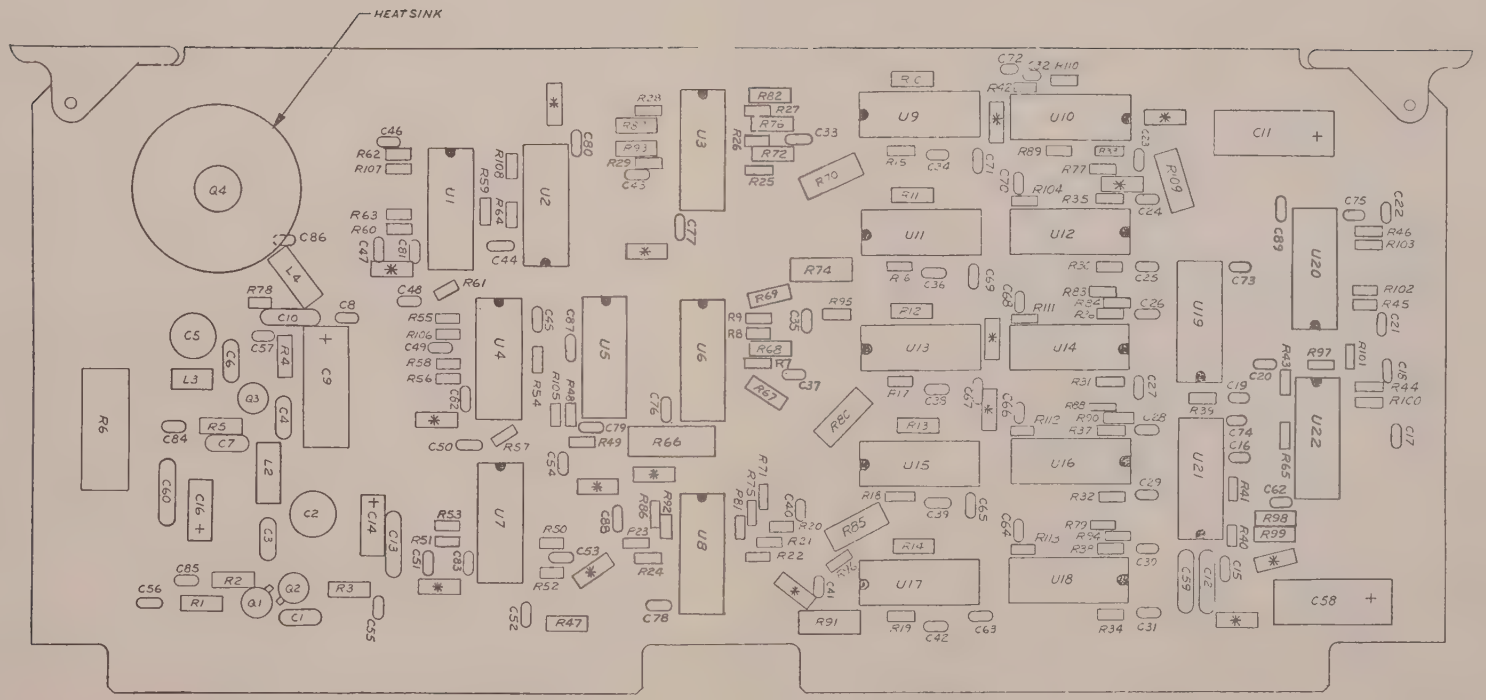
at the clock. This process is repeated with U3 and the outputs of U3 are applied to the inputs of OR/NOR gates U10, U12, U14, U16, and U18.

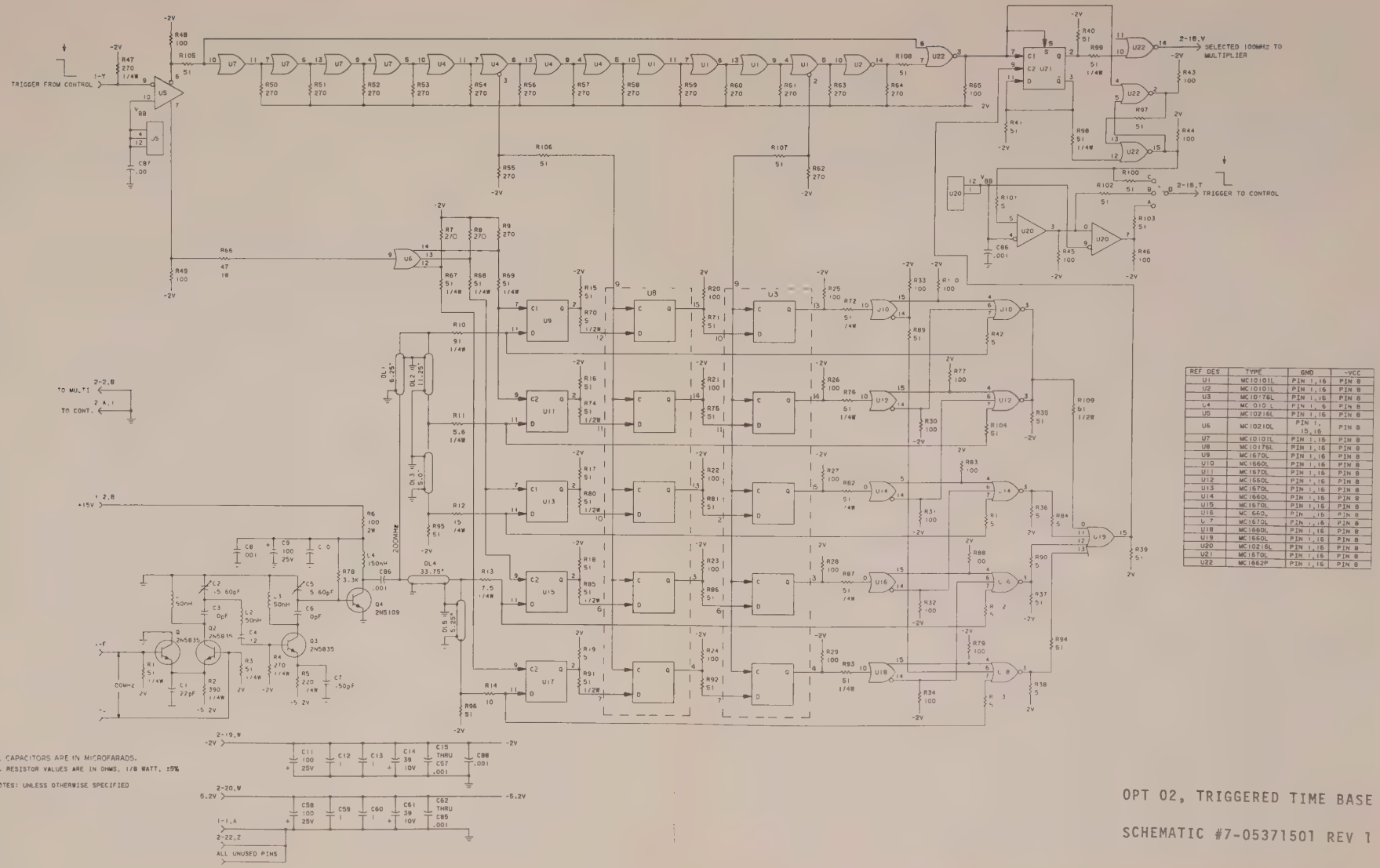
In this case the inputs to the OR gates would be 1 ns high, 2 ns low, 3 ns low, 4 ns low, 5 ns high. Pins 15 of the gates will be the same output level as the inputs and pins 14 will be the opposite level of the inputs. U10-3, U12-3, U14-3, and U18-3 will be disabled by the high inputs. The 200 MHz at U16-3 will be routed through U19-15 to the C2 input of U21. Output of U21 is 100 MHz phased to the trigger output to the control assembly.




* INPUT LEVELS TO U9,U11,U13,U15, AND U17 AT TIME OF POSITIVE CLOCK EXCURSION.

FIGURE OPT 02.1 DELAY CHANNEL TIMING


HEAT SINK
Q4
C86
L4
R78
C10
C8
C5
C6
C57
R4
C9
L3
Q3
C4
R5
C84
C7
L2
C60
C16
C2
C3
C85
R2
Q2
R1
Q1
C1
R3
C56
C55
C14
C13
C51
R51
C83
R53
C50
R55
R106
C49
R58
R56
C82
R57
C48
R61
C46
R62
R107
R63
R60
C47
C81
U1
R108
R59
R64
C44
U2
C80
R23
R93
R29
C43
U3
C87
C45
R54
U4
R105
R48
C79
R49
U5
C54
C88
R50
R52
C53
U7
C52
R47
C76
R66
R86
R22
R24
C78
U6
U8
R82
R27
R79
C33
R26
R72
R25
R70
R74
R69
R8
R68
R7
C37
R67
R85
R91
C40
R20
R21
R22
R19
C42
C41
R18
C39
C65
R14
U17
C63
R34
C31
R13
U15
U16
C29
R32
R79
R94
R38
C30
R12
U13
U14
R31
C27
R17
C38
C67
R88
R90
R37
C28
R111
R112
C66
R11
U11
U12
R30
C25
R6
C36
C69
R83
R84
R36
C26
R15
C34
C71
C70
R89
R77
R104
R35
C24
R9
C35
R95
R10
R109
R110
C72
C32
R40
R42
C23
R33
C22
U9
U10
C11
C73
C89
U20
U19
U21
U22
C75
C82
R46
R103
R102
R45
C21
R101
C18
R44
R100
C17
R43
R97
C20
C19
R39
C74
C16
R41
R65
C62
R98
R99
R40
C59
C12
C15
C58
C61
R91
R47
C78
C52
C53
R52
R24
R23
C68
C64
R113
C30
C31
C63
C42
R19
R34
C31




| REF DES | TYPE | GND | -VCC |
|---|---|---|---|
| U1 | MC10101L | PIN 1,16 | PIN 8 |
| U2 | MC10101L | PIN 1,16 | PIN 8 |
| U3 | MC10176L | PIN 1,16 | PIN 8 |
| U4 | MC 010 L | PIN 1, 6 | PIN 8 |
| U5 | MC10216L | PIN 1,16 | PIN 8 |
| U6 | MC10210L | PIN 1, 15,16 | PIN 8 |
| U7 | MC10101L | PIN 1,16 | PIN 8 |
| U8 | MC10176L | PIN 1,16 | PIN 8 |
| U9 | MC1670L | PIN 1,16 | PIN 8 |
| U10 | MC1660L | PIN 1,16 | PIN 8 |
| U11 | MC1670L | PIN 1,16 | PIN 8 |
| U12 | MC1660L | PIN 1,16 | PIN 8 |
| U13 | MC1670L | PIN 1,16 | PIN 8 |
| U14 | MC1660L | PIN 1,16 | PIN 8 |
| U15 | MC1670L | PIN 1,16 | PIN 8 |
| U16 | MC 660L | PIN 1,16 | PIN 8 |
| U17 | MC1670L | PIN 1,16 | PIN 8 |
| U18 | MC1660L | PIN 1,16 | PIN 8 |
| U19 | MC1660L | PIN 1,16 | PIN 8 |
| U20 | MC10216L | PIN 1,16 | PIN 8 |
| U21 | MC1670L | PIN 1,16 | PIN 8 |
| U22 | MC1662P | PIN 1,16 | PIN 8 |

2. CAPACITORS ARE IN MICROFARADS.
1. RESISTOR VALUES ARE IN OHMS, 1/8 WATT, ±5%

NOTES: UNLESS OTHERWISE SPECIFIED

OPT 02, TRIGGERED TIME BASE

SCHEMATIC #7-05371501 REV 1

EQUIPMENT/ASSEMBLY DESIGNATION Opt 02, Triggered Time Base Assembly #05381801

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SO STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | A3 | ASSEMBLY, TRIGGERED TIME BASE P.C. BOARD | 52542 | 05371501 | 05371501 | 1 |
| | XA3 | CONNECTOR, P.C. EDGE: 22 position Dual Lug | 71785 | 251-22-30-161 | 101167 | 2 |
| | | SCREW, PAN HEAD MACHINE: 4-40 x 1/2 | MIL | MS51957-17 | 10062608 | 4 |
| | | WASHER, #4 flat | MIL | MS15795-803 | 100703 | 4 |
| | | NUT, #4-40 kep | 78189 | 511-041800-00 | 100941 | 4 |
| | | CARD GUIDE | 52542 | 100941 | 053666 | 2 |
| | | CLAMP, CPA 1 3/8" | 56289 | CM5-22 | 100725 | 1 |
| | | TERMINAL, INSULATOR 6-32, FEMALE | 71279 | 2432-2 | 102752 | 2 |
| | CR3,4 | DIODE, RECTIFIER 600 V | 04713 | IN4005 | 100413 | 2 |
| | C3 | CAPACITOR, EL CAN: 2700 µf, 25 V +75-10% | 56289 | 36D272G025AA2A | 100232 | 1 |
| | C4 | CAPACITOR, TANT: 100 µf, 20 V 10% | 56289 | 150D107X902052 | 100208 | 1 |
| | U3 | INTEGRATED CIRCUIT, VOLTAGE REGULATOR, 15V | 07263 | 7815KC | 045282 | 1 |
| | | SOCKET, For TO-3 TRANSISTOR | 04713 | MK-15 | 100689 | 1 |
| | | NUT, 6-32 kep | 78189 | 511-061800-00 | 100862 | 1 |
| | | SCREW, PAN HEAD MACHINE: 6-32 X 5/16 | MIL | MS51957-27 | 10063205 | 3 |
| | | WASHER, #6 split | MIL | MS35338-136 | 100712 | 2 |
| | | WASHER, #6 flat | MIL | MS15795-805 | 100704 | 2 |
| | | Opt 02 Triggered Time Base Assembly #05371501 | | | | |
| | C1 | CAPACITOR, DIODE MICA 22 pF 500V 5% crimped lead | 72136 | DM15ED220J0 | 10006801 | 1 |
| | C2 | CAPACITOR, VARCER 15-60 pF | 72982 | 538-011F15-60 | 100234 | 2 |
| | C3 | CAPACITOR, DIODE MICA 10 pF 500 V 5% crimped lead | 72136 | DM15CD100J0 | 10025301 | 2 |
| | C4 | CAPACITOR, DIODE MICA 12 pF 500 V 5% crimped lead | 72136 | DM15CD120J0 | 10024001 | 1 |
| | C5 | Same as C2 | | | | |
| | C6 | Same as C3 | | | | |
| | C7 | CAPACITOR, DIODE MICA 150 pF 500 V 5% crimped lead | 72136 | DM15FD151J0 | 10021901 | 1 |
| | C8 | CAPACITOR, C MOLD .001 µf 50 V 20% | 71590 | CW15C102M | 100251 | 72 |
| | C9 | CAPACITOR, EL AX 100 µf 25 V +75-10% | 56289 | TE1211 | 100165 | 3 |
| | C10 | CAPACITOR, TANT 1 uf 10 V 10% | 56289 | 150D686X9015R2 | 100176 | 5 |
| | C11 | Same as C9 | | | | |
| | C12 | Same as C10 | | | | |
| | C13 | Same as C10 | | | | |
| | C14 | CAPACITOR, TANT 39 µf 10 V 10% | 56289 | 150D396X9010B2 | 100183 | 2 |
| | C15 | Same as C8 | | | | |
| | C16 | Same as C8 | | | | |
| | C17 | Same as C8 | | | | |
| | C18 | Same as C8 | | | | |
| | C19 | Same as C8 | | | | |
| | C20 | Same as C8 | | | | |
| | C21 | Same as C8 | | | | |
| | C22 | Same as C8 | | | | |
| | C23 | Same as C8 | | | | |
| | C24 | Same as C8 | | | | |
| | C25 | Same as C8 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Opt 02, Triggered Time Base Assembly #05371501 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | C26 | Same as C8 | | | | |
| | C27 | Same as C8 | | | | |
| | C28 | Same as C9 | | | | |
| | C29 | Same as C8 | | | | |
| | C30 | Same as C8 | | | | |
| | C31 | Same as C8 | | | | |
| | C32 | Same as C8 | | | | |
| | C33 | Same as C8 | | | | |
| | C34 | Same as C8 | | | | |
| | C35 | Same as C8 | | | | |
| | C36 | Same as C8 | | | | |
| | C37 | Same as C8 | | | | |
| | C38 | Same as C8 | | | | |
| | C39 | Same as C8 | | | | |
| | C40 | Same as C8 | | | | |
| | C41 | Same as C8 | | | | |
| | C42 | Same as C8 | | | | |
| | C43 | Same as C8 | | | | |
| | C44 | Same as C8 | | | | |
| | C45 | Same as C8 | | | | |
| | C46 | Same as C8 | | | | |
| | C47 | Same as C8 | | | | |
| | C48 | Same as C8 | | | | |
| | C49 | Same as C8 | | | | |
| | C50 | Same as C8 | | | | |
| | C51 | Same as C8 | | | | |
| | C52 | Same as C8 | | | | |
| | C53 | Same as C8 | | | | |
| | C54 | Same as C8 | | | | |
| | C55 | Same as C8 | | | | |
| | C56 | Same as C8 | | | | |
| | C57 | Same as C8 | | | | |
| | C58 | Same as C9 | | | | |
| | C59 | Same as C10 | | | | |
| | C60 | Same as C10 | | | | |
| | C61 | Same as C14 | | | | |
| | C62 | Same as C8 | | | | |
| | C63 | Same as C8 | | | | |
| | C64 | Same as C8 | | | | |
| | C65 | Same as C8 | | | | |
| | C66 | Same as C8 | | | | |
| | C67 | Same as C8 | | | | |
| | C68 | Same as C8 | | | | |
| | C69 | Same as C8 | | | | |
| | C70 | Same as C8 | | | | |
| | C71 | Same as C8 | | | | |
| | C72 | Same as C8 | | | | |
| | C73 | Same as C8 | | | | |
| | C74 | Same as C8 | | | | |
| | C75 | Same as C8 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Opt 02, Triggered Time Base Assembly #05371501 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | C76 | Same as C8 | | | | |
| | C77 | Same as C8 | | | | |
| | C78 | Same as C8 | | | | |
| | C79 | Same as C8 | | | | |
| | C80 | Same as C8 | | | | |
| | C81 | Same as C8 | | | | |
| | C82 | Same as C8 | | | | |
| | C83 | Same as C8 | | | | |
| | C84 | Same as C8 | | | | |
| | C85 | Same as C8 | | | | |
| | C86 | Same as C8 | | | | |
| | C87 | Same as C8 | | | | |
| | C88 | Same as C8 | | | | |
| | C89 | Same as C8 | | | | |
| | Q1 | TRANSISTOR, SILICON NPN | 04713 | 2N5835 | 101410 | 3 |
| | Q2 | Same as Q1 | | | | |
| | Q3 | Same as Q1 | | | | |
| | Q4 | TRANSISTOR, SILICON NPN | | 2N5109 | 106591 | 1 |
| | R1 | RESISTOR, COMP: 51Ω 5%, 1/4 w | 01121 | CB5105 | 101672 | 12 |
| | R2 | RESISTOR, COMP: 390Ω 5%, 1/4 w | 01121 | CB3915 | 101592 | 1 |
| | R3 | Same as R1 | | | | |
| | R4 | RESISTOR, COMP: 270Ω 5%, 1/4 w | 01121 | CB2715 | 101542 | 2 |
| | R5 | RESISTOR, COMP: 220Ω 5%, 1/4 w | 01121 | CB2215 | 101566 | 1 |
| | R6 | RESISTOR, COMP: 100Ω 5%, 2 w | 01121 | HB1015 | 101763 | 1 |
| | R7 | RESISTOR, COMP: 270Ω 5%, 1/8 w | 01121 | BB2715 | 101703 | 18 |
| | R8 | Same as R7 | | | | |
| | R9 | Same as R7 | | | | |
| | R10 | RESISTOR, COMP: 91Ω 5%, 1/4 w | 01121 | CB9105 | 101663 | 1 |
| | R11 | RESISTOR, COMP: 5.6Ω 5%, 1/4 w | 01121 | CB56G5 | 101995 | 1 |
| | R12 | RESISTOR, COMP: 15Ω 5%, 1/4 w | 01121 | CB1505 | 101764 | 1 |
| | R13 | RESISTOR, COMP: 7.5Ω 5%, 1/4 w | 01121 | CB75G5 | 101887 | 1 |
| | R14 | RESISTOR, COMP: 10Ω 5%, 1/8 w | 01121 | BB1005 | 101834 | 1 |
| | R15 | RESISTOR, COMP: 51Ω 5%, 1/8 w | 01121 | BB5105 | 101815 | 37 |
| | R16 | Same as R15 | | | | |
| | R17 | Same as R15 | | | | |
| | R18 | Same as R15 | | | | |
| | R19 | Same as R15 | | | | |
| | R20 | RESISTOR, COMP: 100Ω 5%, 1/8 w | 01121 | BB1015 | 101701 | 27 |
| | R21 | Same as R20 | | | | |
| | R22 | Same as R20 | | | | |
| | R23 | Same as R20 | | | | |
| | R24 | Same as R20 | | | | |
| | R25 | Same as R20 | | | | |
| | R26 | Same as R20 | | | | |
| | R27 | Same as R20 | | | | |
| | R28 | Same as R20 | | | | |
| | R29 | Same as R20 | | | | |
| | R30 | Same as R20 | | | | |
| | R31 | Same as R20 | | | | |
| | R32 | Same as R20 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Opt 02, Triggered Time Base Assembly #05371501 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | R33 | Same as R20 | | | | |
| | R34 | Same as R20 | | | | |
| | R35 | Same as R15 | | | | |
| | R36 | Same as R15 | | | | |
| | R37 | Same as R15 | | | | |
| | R38 | Same as R15 | | | | |
| | R39 | Same as R15 | | | | |
| | R40 | Same as R15 | | | | |
| | R41 | Same as R15 | | | | |
| | R42 | Same as R15 | | | | |
| | R43 | Same as R15 | | | | |
| | R44 | Same as R15 | | | | |
| | R45 | Same as R15 | | | | |
| | R46 | Same as R15 | | | | |
| | R47 | Same as R4 | | | | |
| | R48 | Same as R20 | | | | |
| | R49 | Same as R20 | | | | |
| | R50 | Same as R7 | | | | |
| | R51 | Same as R7 | | | | |
| | R52 | Same as R7 | | | | |
| | R53 | Same as R7 | | | | |
| | R54 | Same as R7 | | | | |
| | R55 | Same as R7 | | | | |
| | R56 | Same as R7 | | | | |
| | R57 | Same as R7 | | | | |
| | R58 | Same as R7 | | | | |
| | R59 | Same as R7 | | | | |
| | R60 | Same as R7 | | | | |
| | R61 | Same as R7 | | | | |
| | R62 | Same as R7 | | | | |
| | R63 | Same as R7 | | | | |
| | R64 | Same as R7 | | | | |
| | R65 | Same as R20 | | | | |
| | R66 | RESISTOR, COMP: 47Ω 5%, 1 w | 01121 | GB4705 | 100004 | 1 |
| | R67 | Same as R1 | | | | |
| | R68 | Same as R1 | | | | |
| | R69 | Same as R1 | | | | |
| | R70 | RESISTOR, COMP: 51Ω 5%, 1/2 w | 01121 | EB5105 | 101490 | 6 |
| | R71 | Same as R15 | | | | |
| | R72 | Same as R1 | | | | |
| | R73 | NOT USED | | | | |
| | R74 | Same as R70 | | | | |
| | R75 | Same as R15 | | | | |
| | R76 | Same as R1 | | | | |
| | R77 | Same as R20 | | | | |
| | R78 | RESISTOR, COMP: 3.3 K 5%, 1/8 w | 01121 | BB3325 | 101713 | 1 |
| | R79 | Same as R20 | | | | |
| | R80 | Same as R70 | | | | |
| | R81 | Same as R15 | | | | |
| | R82 | Same as R1 | | | | |

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Opt 02, Triggered Time Base Assembly #05371501 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | R83 | Same as R20 | | | | |
| | R84 | Same as R15 | | | | |
| | R85 | Same as R70 | | | | |
| | R86 | Same as R15 | | | | |
| | R87 | Same as R1 | | | | |
| | R88 | Same as R20 | | | | |
| | R89 | Same as R15 | | | | |
| | R90 | Same as R15 | | | | |
| | R91 | Same as R70 | | | | |
| | R92 | Same as R15 | | | | |
| | R93 | Same as R1 | | | | |
| | R94 | Same as R15 | | | | |
| | R95 | Same as R15 | | | | |
| | R96 | Same as R15 | | | | |
| | R97 | Same as R15 | | | | |
| | R98 | Same as R1 | | | | |
| | R99 | Same as R1 | | | | |
| | R100 | Same as R15 | | | | |
| | R101 | Same as R15 | | | | |
| | R102 | Same as R15 | | | | |
| | R103 | Same as R15 | | | | |
| | R104 | Same as R15 | | | | |
| | R105 | Same as R15 | | | | |
| | R106 | Same as R15 | | | | |
| | R107 | Same as R15 | | | | |
| | R108 | Same as R15 | | | | |
| | R109 | Same as R70 | | | | |
| | R110 | Same as R20 | | | | |
| | R111 | Same as R15 | | | | |
| | R112 | Same as R15 | | | | |
| | R113 | Same as R15 | | | | |
| | U1 | INTEGRATED CIRCUIT, ECL: Quad Gate | 04713 | MC10101L | 025791 | 4 |
| | U2 | Same as U1 | | | | |
| | U3 | INTEGRATED CIRCUIT, HEX: Master/Slave | 04713 | MC10176L | 103028 | 2 |
| | U4 | Same as U1 | | | | |
| | U5 | INTLGRATED CIRCUIT, SSI: Triple Line Receiver | 04713 | MC10216L | 045276 | 2 |
| | U6 | INTEGRATED CIRCUIT, Dual 3-input, 3-out OR Gate | 04713 | MC10210L | 103118 | 1 |
| | U7 | Same as U1 | | | | |
| | U8 | Same as U3 | | | | |
| | U9 | INTEGRATED CIRCUIT, ECL: D Type Flip-Flop | 04713 | MC1670L | 025765 | 6 |
| | U10 | INTEGRATED CIRCUIT, ECL: Dual 4-input Gate | 04713 | MC1660L | 025777 | 6 |
| | U11 | Same as U9 | | | | |
| | U12 | Same as U10 | | | | |
| | U13 | Same as U9 | | | | |
| | U14 | Same as U10 | | | | |
| | U15 | Same as U9 | | | | |
| | U16 | Same as U10 | | | | |
| | U17 | Same as U9 | | | | |

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Opt-02, Triggered Time Base Assembly #05371501 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SP STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | U18 | Same as U10 | | | | |
| | U19 | Same as U10 | | | | |
| | U20 | Same as U5 | | | | |
| | U21 | Same as U9 | | | | |
| | U22 | INTEGRATED CIRCUIT, ECL Quad 2-input NOR Gate | 04713 | MC1662L | 025778 | 1 |
| | L1 | INDUCTOR, FIXED: .05µh, 10% | 26618 | A500K81-10 | 103117 | 3 |
| | L2 | Same as L1 | | | | |
| | L3 | Same as L1 | | | | |
| | L4 | INDUCTOR, FIXED: .15µh, 5% | 99800 | 2500-36 | 101304 | 1 |
| | | HEATSINK, TO-5 | 05820 | 290CB | 100497 | 1 |
| | | MOLDED JUMPER | GETTIG | L-2007-1 | 102879 | 16 |
| | | EXTRACTOR, HOT STAMP A3 | 52542 | 03984203 | 03984203 | 1 |
| | | EXTRACTOR, 1/16 MAT | 51495 | 1743 | 100865 | 2 |
| | | ROLL PIN | 73957 | 50-0940250 | 100752 | 2 |
| | | TERMINAL, SWAGE BIFUR | 88245 | 1309B-1 | 100508 | 9 |
| | | TERMINAL, SWAGE BIFUR | 88245 | 2000B | 100482 | 9 |

# DELAY RANGE EXTENSION
# OPTION 05
# SCHEMATIC #7-05365808 and #7-05371001

Installation of Option 05 extends the delay time of the instrument to 9999999.99 µs. This option is shown installed in Wiring Interconnect Schematic #7-05365808 and Channel Schematic #7-05371001.

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Opt 05, Delay Range Extension #05381904

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO | (6) T/Q |
|---|---|---|---|---|---|---|
| | | DELETE | | | | |
| | S11 | SPACER, SWITCH: .35IN Black Matte | 07126 | 29-10004/B | 102358 | 4 |
| | S21 | Same as S11 | | | | |
| | S31 | Same as S11 | | | | |
| | S41 | Same as S11 | | | | |
| | | ADD | | | | |
| | S11 | SPACER, SWITCH: BCD w/DIODE | 52542 | 05130005 | 05130005 | 4 |
| | S21 | Same as S11 | | | | |
| | S31 | Same as S11 | | | | |
| | S41 | Same as S11 | | | | |

# REMOTE SERIAL PROGRAMMING
# OPTIONS 10 and 11
# SCHEMATIC #7-015371601 and #7-015371701

## 1.1 INTRODUCTION

Remote serial programming is available for systems using either positive true or ground true inputs. In either case the circuitry operates in the same manner. The placement of jumper wire, W6, determines the positive or ground true operation. All functions except power ON/OFF can be controlled from the remote position. Tables Opt 10/11.1 and Opt 10/11.2 show the program information and programming for data, trigger source, and mode selection.

## 1.2 CIRCUIT DESCRIPTION

The remote serial programming option consists of two board assemblies, A8 and A9, rear input connector, and interconnect wiring. Programming information is entered into A8 through exclusive OR gates U10, U11, U12, and U13. All of the 10 data bits must be programmed for each byte, to enter data, trigger source, and operational mode. The control line, pin 2-16, is held at the appropriate input level at any time remote control is operating. The address circuit, exclusive OR gates U10-8, 11, and two-to-four line converter U24, is optional and the instrument is normally shipped with this circuit disabled.

With the control on, the output from U13-8 is low. In assembly A8, Schematic #7-05371601, the low enables gate U25-3, and, through U25-6, disables U1 through U9, to allow individual strobing of the storage registers in the channel assembly. The control line is also connected to assembly A9. The clock input, through U13-11, triggers one-shot U27, the resultant low pulse through OR gate U25-11 and OR gates U23, strobes the output gates U14, U15, U16, U17, U18, U19, U20, U21, and U22. The clock pulse is also distributed to assembly A9.

The digit input, gates U12-6, 3, 8, 11, are applied to U28, four-to-ten line converter. The output of U28 is strobed through the output gates by the clock pulse and is the strobe pulse to the storage registers in the channel assembly. Digits 1 and 2 are also distributed to assembly A9. Digits 2, 4, and 8 are also applied to disable gate U26. If 8 and 4 are high, or 8 and 2 are high, U25-3 is disabled and either trigger source, or mode, is enabled in assembly A9.

The inputs of U10-6, 3 are routed to U24, two-to-four line converter. The output of U24 enables OR gates U23 so the clock pulse can strobe the correct output gate. These outputs are also routed to assembly A9. The output of the values gates, U11, are routed directly through to assembly A9.

When applied to assembly A9, Schematic #7-05371701, the control is routed to inverters U15-6, 4, 10 and to OR gate U12-3. U15-6

enables gates U9 and U10, U15-4 enables gates U1 and U2, this signal is again inverted, by U15-12, and applied to the control assembly to inhibit the strobe gate. U15-10 enables gates U3 and U4. Gates U1, U2, U3, and U4 apply the values digits to the inputs of the storage registers in the channel assembly. U12-3 disables the front panel trigger source switch commons so the front panel switches are inoperative.

The values digits are inverted by U11 and applied, through output gates U1, U2, U3, and U4, to the inputs of the storage registers in the channel assembly. They are also applied to storage registers U19 and U22. The outputs of U10-3, 6, and U12-8, 11, in assembly A8, are routed to storage register U21. Outputs of U10-3 and U12-11 are also routed, through inverters U11-2, U15-2, to U20. Outputs of U21 and U22 are routed to U16 and U17, two-to-four line converters, for trigger source selection. If the repetitive mode, RECYCLE, is selected for a channel, the AND gate, U18, associated with that channel is held low to inhibit the channel trigger selection.

If U12-3, 6, assembly A8, inputs are high, the disable gate, U26-6, is low and U25-3 is disabled. The low at U26-6 is routed to assembly A9 to enable gate U12-8. The clock pulse then strobes U21 and U22 to enter the information to the trigger source selection circuits. If U12-6, 8 are high, U26-11 is low and is routed to assembly A9 to enable gate U12-11, and the clock pulse strobes storage registers U19 and U20.

## TABLE-OPT 10/11.1 SERIAL PROGRAM INFORMATION

| Program Format | Address Instrument * | | DATA BITS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Pin J1- | 12 | 11 | 1 | | | | | | | | | |
| Data | "2" | "1" | Digit "8" | Digit "4" | Digit "2" | Digit "1" | Channel "2" | Channel "1" | Value "8" | Value "4" | Value "2" | Value "1" |
| Trigger Source | "2" | "1" | 1 | 1 | Chan 1 "2" | Chan 1 "1" | Chan 2 "2" | Chan 2 "1" | Chan 3 "2" | Chan 3 "1" | Chan 4 "2" | Chan 4 "1" |
| Modes | "2" | "1" | 1 | 0 | 1 | Ext Trigger | Ext Clock | Stop | Ch 1 Recycle | Ch 2 Recycle | Ch 3 Recycle | Ch 4 Recycle |

Special Pin Assignments: J1-24 Program Clock
Logic Levels: TTL J1-25 Remote Control
J1-50 Ground Return

Option 1D: +2 to +5V true, 0 to +.8V false

Option 11: 0 to +.8V true, +2 to +5V false

* Address is optional. Requires correct jumpering in Remote Control card.

## TABLE OPT 10/11.2 SERIAL PROGRAMMING

### DATA BYTE

| Data Bit | 1 | 2 | 3 | 4 | | 5 | 6 | | 7 | 8 | 9 | 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | + | + | + | + | 1S (MSD) | + | + | Chan 1 | + | + | + | + | 0 |
| | + | + | + | 0 | 100 ms | + | 0 | Chan 2 | + | + | + | 0 | 1 |
| | + | + | 0 | + | 10 ms | 0 | + | Chan 3 | + | + | 0 | + | 2 |
| | + | + | 0 | 0 | 1 ms | 0 | 0 | Chan 4 | + | + | 0 | 0 | 3 |
| | + | 0 | + | + | 100 µs | | | | + | 0 | + | + | 4 |
| | + | 0 | + | 0 | 10 µs | | Channel # | | + | 0 | + | 0 | 5 |
| | + | 0 | 0 | + | 1 µs | | | | + | 0 | 0 | + | 6 |
| | + | 0 | 0 | 0 | 100 ns | | | | + | 0 | 0 | 0 | 7 |
| | 0 | + | + | + | 10 ns (LSD) | | | | 0 | + | + | + | 8 |
| | | | | | | | | | 0 | + | + | 0 | 9 |
| | | | Digit # | | | | | | | | Digit Value | | |

### TRIGGER SOURCE BYTE

| Data Bit | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | + + | TØ | + + | TØ | + + | TØ | + + | TØ |
| | | | + 0 | CH 2 | + 0 | CH 1 | + 0 | CH 1 | + 0 | CH 1 |
| | | | 0 + | CH 3 | 0 + | CH 3 | 0 + | CH 2 | 0 + | CH 2 |
| | | | 0 0 | CH 4 | 0 0 | CH 4 | 0 0 | CH 4 | 0 0 | CH 3 |
| | Trigger Source Byte Control Bits | | Chan 1 Trigger Source | | Chan 2 Trigger Source | | Chan 3 Trigger Source | | Chan 4 Trigger Source | |

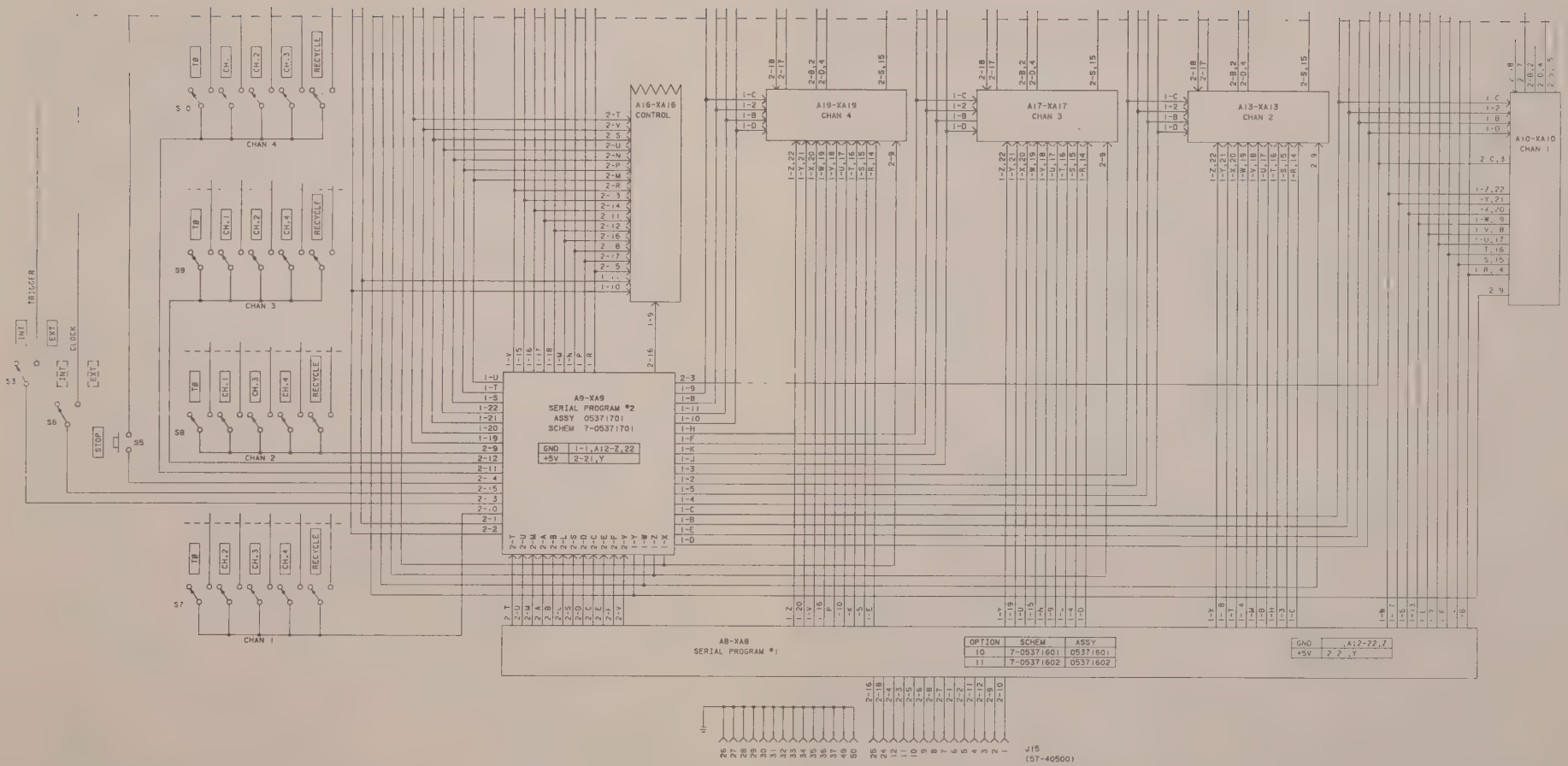
### MODE BYTE

| Data Bit | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | + | 0 | + Local Trigger<br>0 Ext Trigger | + Local Clock<br>0 Ext Clock | + Run<br>0 Stop | + Channel 1<br>0 | + Channel 2<br>0 | + Channel 3<br>0 | + Delay Mode<br>0 Recycle Mode |
| | Control Bits | | | TØ Source Select | Clock Select | Stop Control | Mode Select | | | |

NOTES:

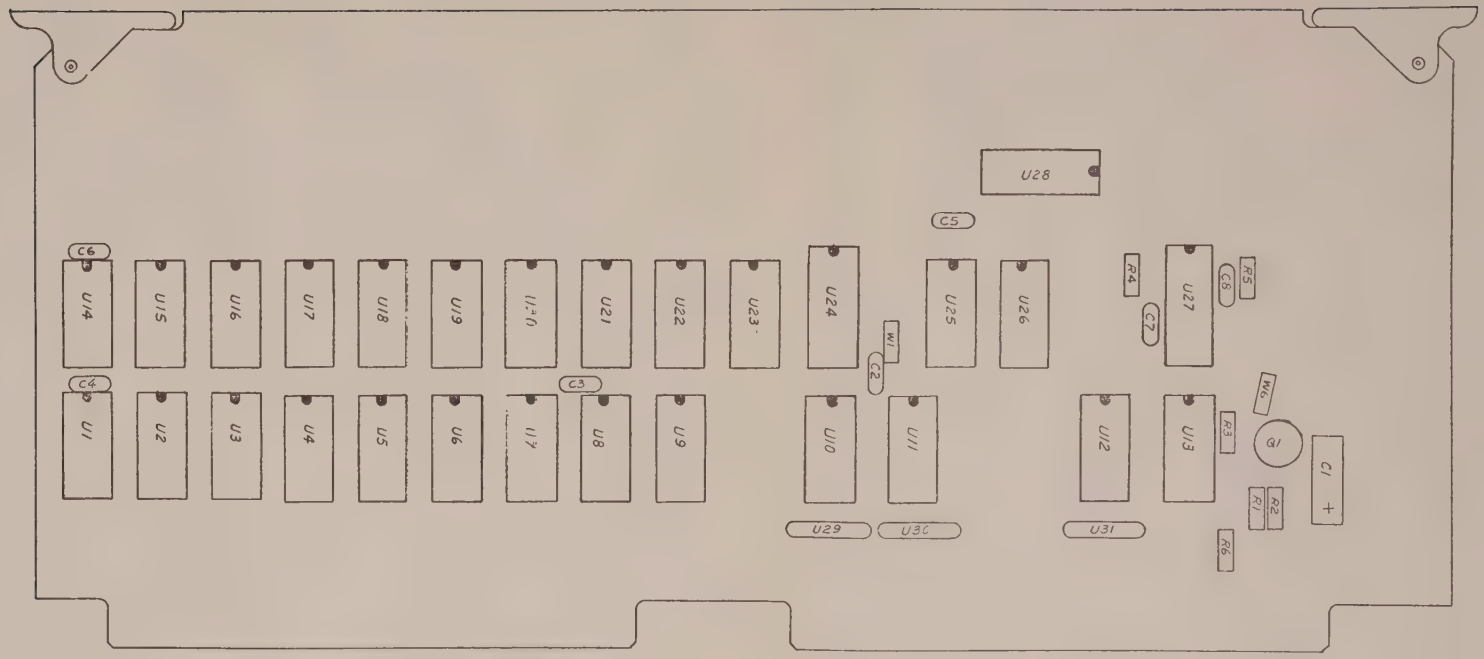
1) Any data bit may be changed at any time except the three microseconds immediately following the negative transition of the program clock.
2) All ten data bits must be programmed for each byte.
3) Bytes may be programmed in any order.
4) A full word need not be used to update a program. Only the affected bytes need be reprogrammed.

EXISTING WIRING



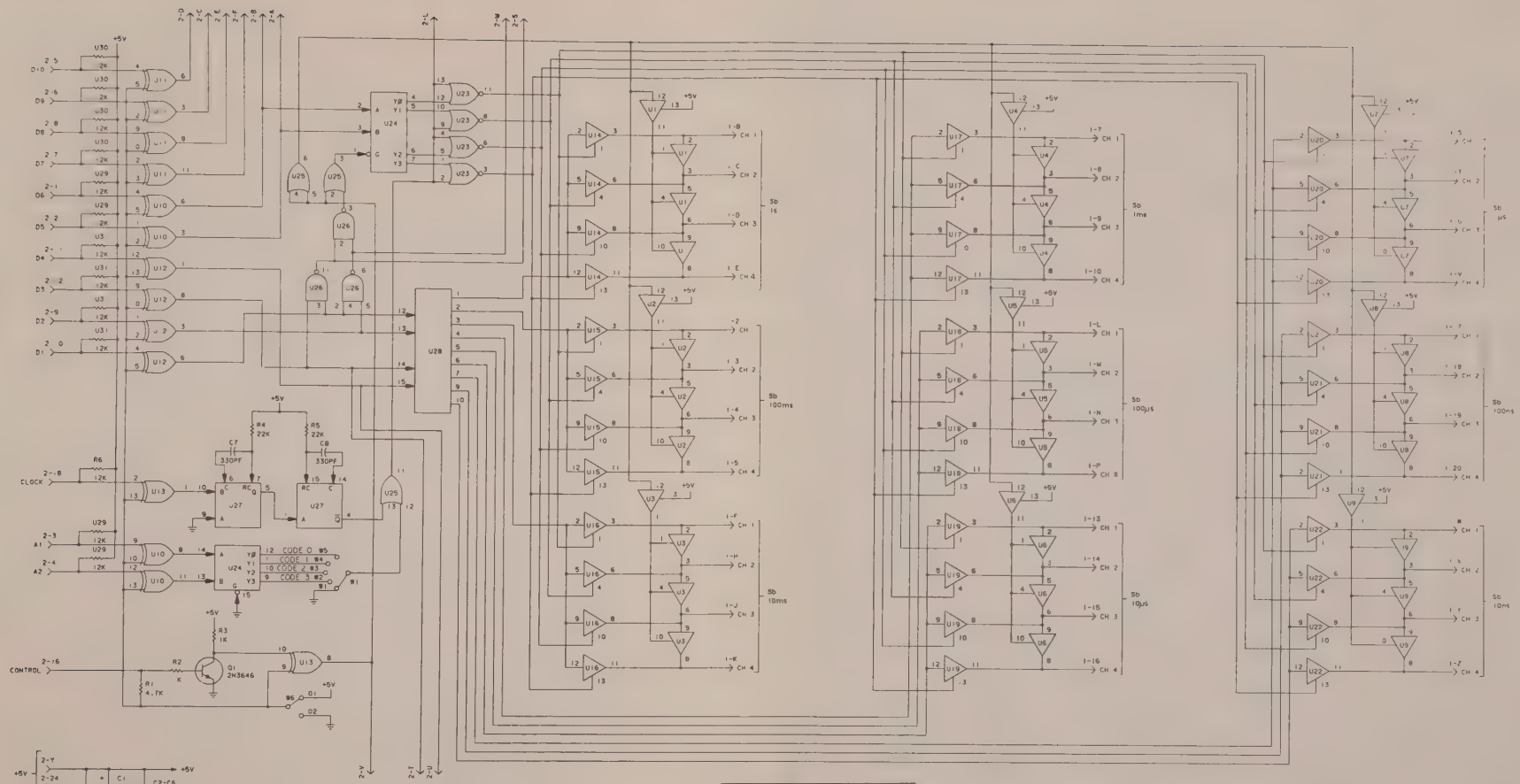

OPT 10/OPT 11, SERIAL PROGRAM WIRING

SCHEMATIC #7-053820 REV 1




OPT 10/OPT 11 SERIAL PROGRAM #1

ASSEMBLY #05371601 REV 1



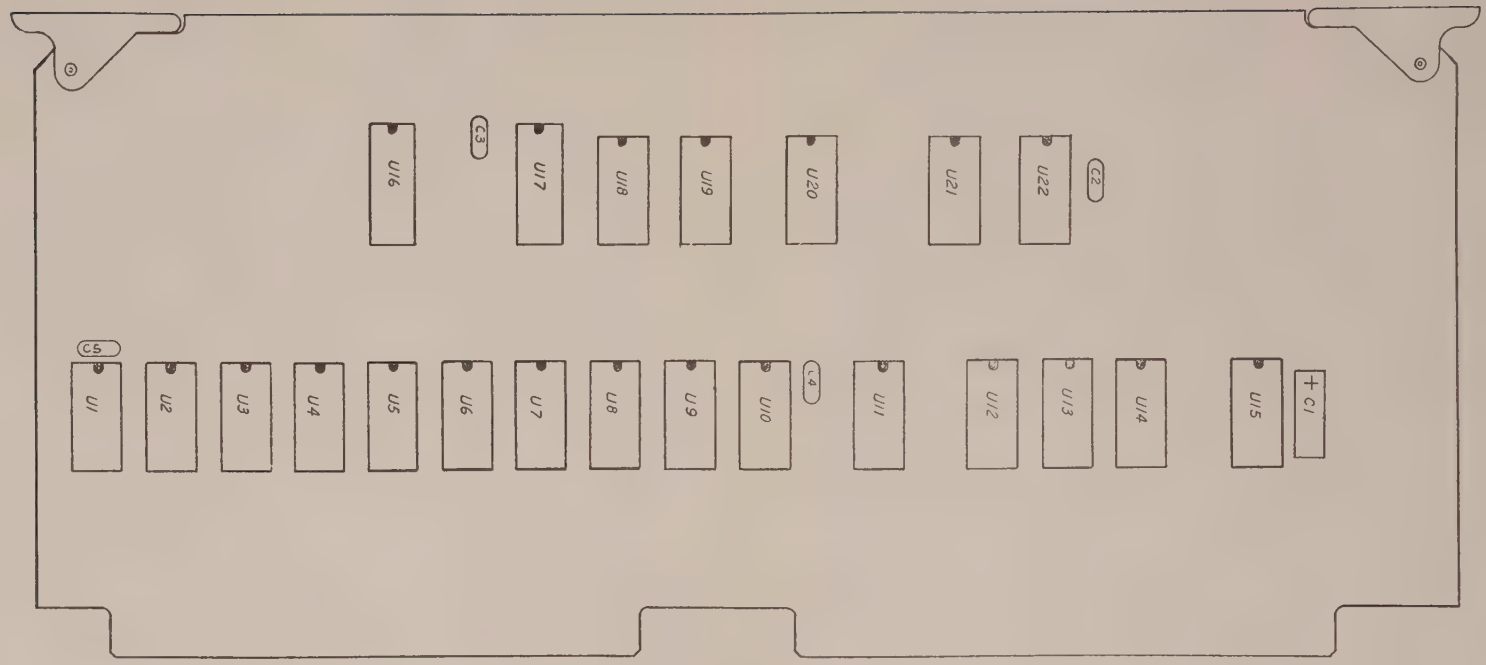
| REF DES | TYPE | +5V | GND |
|---|---|---|---|
| U1 | SN74126N | PIN 14 | PIN 7 |
| U2 | SN74126N | PIN 14 | PIN 7 |
| U3 | SN74126N | PIN 14 | PIN 7 |
| U4 | SN74126N | PIN 14 | PIN 7 |
| U5 | SN74126N | PIN 14 | PIN 7 |
| U6 | SN74126N | PIN 14 | PIN 7 |
| U7 | SN74126N | PIN 14 | PIN 7 |
| U8 | SN74126N | PIN 14 | PIN 7 |
| U9 | SN74126N | PIN 14 | PIN 7 |
| L10 | MC3021P | PIN 14 | PIN 7 |
| L1 | MC3021P | PIN 14 | PIN 7 |
| U12 | MC3021P | PIN 14 | PIN 7 |
| U13 | MC3021P | PIN 14 | PIN 7 |
| U14 | SN74126N | PIN 14 | PIN 7 |
| U15 | SN74126N | PIN 14 | PIN 7 |
| U16 | SN74126N | PIN 14 | PIN 7 |
| U17 | SN74126N | PIN 14 | PIN 7 |
| U18 | SN74126N | PIN 14 | PIN 7 |
| U19 | SN74126N | PIN 14 | PIN 7 |
| U20 | SN74126N | PIN 14 | PIN 7 |
| U21 | SN74126N | PIN 14 | PIN 7 |
| U22 | SN74126N | PIN 14 | PIN 7 |
| U23 | MC3002P | PIN 14 | PIN 7 |
| U24 | SN74LS139N | PIN 16 | PIN 8 |
| U25 | MC3003P | PIN 14 | PIN 7 |
| U26 | SN7400N | PIN 14 | PIN 7 |
| U27 | SN74123N | PIN 16 | PIN 8 |
| U28 | SN7442N | PIN 16 | PIN 8 |

1. RESISTOR VALUES ARE IN OHMS, 1/4 WATT, ±5%

NOTES: UNLESS OTHERWISE SPECIFIED

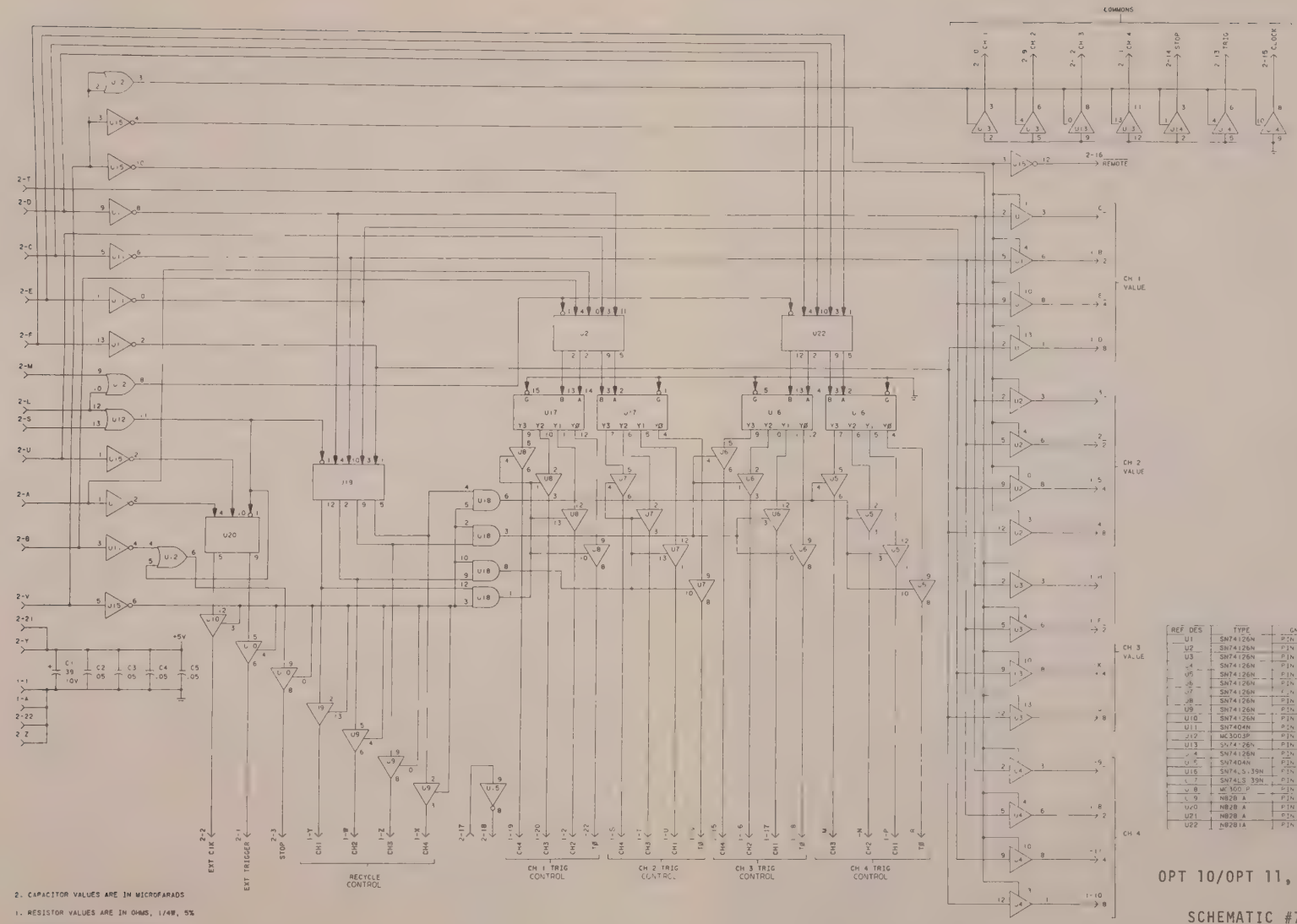
OPT 10/OPT 11, SERIAL PROGRAM #1

SCHEMATIC #05371601 REV 1




OPT 10/OPT11, SERIAL PROGRAM # 2

#05371701 REV 1




| REF DES | TYPE | GND | VCC |
|---|---|---|---|
| U1 | SN74126N | PIN 7 | PIN 4 |
| U2 | SN74126N | PIN 7 | PIN 4 |
| U3 | SN74126N | PIN 7 | PIN 4 |
| U4 | SN74126N | PIN 7 | PIN 4 |
| U5 | SN74126N | PIN 7 | PIN 4 |
| U6 | SN74126N | PIN 7 | PIN 4 |
| U7 | SN74126N | PIN 7 | PIN 4 |
| U8 | SN74126N | PIN 7 | PIN 4 |
| U9 | SN74126N | PIN 7 | PIN 4 |
| U10 | SN74126N | PIN 7 | PIN 4 |
| U11 | SN7404N | PIN 7 | PIN 4 |
| U12 | MC300JP | PIN 7 | PIN 4 |
| U13 | SN74126N | PIN 7 | PIN 4 |
| U14 | SN74126N | PIN 7 | PIN 4 |
| U15 | SN7404N | PIN 7 | PIN 4 |
| U16 | SN74LS-39N | PIN 8 | PIN 5 |
| U17 | SN74LS 39N | PIN 8 | PIN 5 |
| U18 | MC300 P | PIN 7 | PIN 4 |
| U19 | NB2B A | PIN 7 | PIN 4 |
| U20 | NB2B A | PIN 7 | PIN 4 |
| U21 | NB2B A | PIN 7 | PIN 4 |
| U22 | NB281A | PIN 7 | PIN 4 |

2. CAPACITOR VALUES ARE IN MICROFARADS

1. RESISTOR VALUES ARE IN OHMS, 1/4W, 5%

NOTES: UNLESS OTHERWISE SPECIFIED

OPT 10/OPT 11, SERIAL PROGRAM #2

SCHEMATIC #7-05371701 REV 1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Opt 10, Final Assembly #05382001

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/2 |
|---|---|---|---|---|---|---|
| | A8 | ASSEMBLY, SERIAL PROGRAM #1, P.C. BOARD | 52542 | 05371601 | 05371601 | 1 |
| | A9 | ASSEMBLY, SERIAL PROGRAM #2, P.C. BOARD | 52542 | 05371701 | 05371701 | 1 |
| | XA8 | CONNECTOR, 22 POSITION: Dual lug | 71785 | 251-22-30-161 | 101167 | 4 |
| | XA9 | Same as XA8 | | | | |
| | | SCREW, PAN HEAD MACHINE: 4-40 x 1/2 | MIL | MS51957-17 | 10062608 | 8 |
| | | WASHER: #4, flat | MIL | MS15795-803 | 100703 | 8 |
| | | NUT: 4-40 kep | 78189 | 511-041800-00 | 100941 | 8 |
| | | CARD GUIDE | 52542 | 053666 | 053666 | 4 |
| | | Opt 11, Final Assembly #05382101 | | | | |
| | A8 | ASSEMBLY, SERIAL PROGRAM #1, P.C. BOARD | 52542 | 05371602 | 05371602 | 1 |
| | A9 | ASSEMBLY, SERIAL PROGRAM #2, P.C. BOARD | 52542 | 05371701 | 05371701 | 1 |
| | XA8 | CONNECTOR, 22 POSITION: Dual lug | 71785 | 251-22-30-161 | 101167 | 4 |
| | XA9 | Same as XA8 | | | | |
| | | SCREW, PAN HEAD MACHINE: 4-40 x 1/2 | MIL | MS51957-17 | 10062608 | 8 |
| | | WASHER: #4, flat | MIL | MS15795-803 | 100703 | 8 |
| | | NUT: 4-40 kep | 78189 | 511-041800-00 | 100941 | 8 |
| | | CARD GUIDE | 52542 | 053666 | 053666 | 4 |
| | | Opt 10/Opt 11 Serial Program Assembly #1 #05371601 | | | | |
| | C1 | CAPACITOR, TANT 39 µf, 10 V 10% | 56289 | 150D396X9010B2 | 100183 | 1 |
| | C2 | CAPACITOR, DISC CERAMIC: .05µf, 10 V +80-20% | 71590 | UK10-503 | 100122 | 5 |
| | C3 | Same as C2 | | | | |
| | C4 | Same as C2 | | | | |
| | C5 | Same as C2 | | | | |
| | C6 | Same as C2 | | | | |
| | C7 | CAPACITOR, DISC MICA, 270 pf, 500 V 5% crimp lead | 72136 | DM15F271J0- | 10023801 | 2 |
| | C8 | Same as C7 | | | | |
| | Q1 | TRANSISTOR, SILICON NPN | 07263 | 2N3646 | 101369 | 1 |
| | R1 | RESISTOR, COMP: 4.7 K, 5% 1/4 w | 01121 | CB4725 | 101598 | 1 |
| | R2 | RESISTOR, COMP: 1 K, 5% 1/4 w | 01121 | CB1025 | 101569 | 2 |
| | R3 | Same as R2 | | | | |
| | R4 | RESISTOR, COMP: 22 K, 5% 1/4 w | 01121 | CB2235 | 101572 | 2 |
| | R5 | Same as R4 | | | | |
| | R6 | RESISTOR, COMP: 12 K, 5% 1/4 w | 01121 | CB1235 | 101565 | 1 |
| | U1 | INTEGRATED CIRCUIT, TTL/SSI: 4 3 state BUS BFR | 01295 | SN74126N | 045298 | 18 |
| | U2 | Same as U1 | | | | |
| | U3 | Same as U1 | | | | |
| | U4 | Same as U1 | | | | |
| | U5 | Same as U1 | | | | |
| | U6 | Same as U1 | | | | |
| | U7 | Same as U1 | | | | |
| | U8 | Same as U1 | | | | |
| | U9 | Same as U1 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Opt 10/11 Serial Program Assembly #1 #05371601 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | U10 | INTEGRATED CIRCUIT, TTL/SSI: Quad 2-input Exclusive OR Gate | 04713 | MC3021P | 025739 | 4 |
| | U11 | Same as U10 | | | | |
| | U12 | Same as U10 | | | | |
| | U13 | Same as U10 | | | | |
| | U14 | Same as U1 | | | | |
| | U15 | Same as U1 | | | | |
| | U16 | Same as U1 | | | | |
| | U17 | Same as U1 | | | | |
| | U18 | Same as U1 | | | | |
| | U19 | Same as U1 | | | | |
| | U20 | Same as U1 | | | | |
| | U21 | Same as U1 | | | | |
| | U22 | Same as U1 | | | | |
| | U23 | INTEGRATED CIRCUIT, TTL/SSI: Quad 2-input AND Gates | 04713 | MC3002P | 025739 | 1 |
| | U24 | INTEGRATED CIRCUIT, TTL/MSI: Dual 2-4 Line Decoder | 01295 | SN74LS139N | 045299 | 1 |
| | U25 | INTEGRATED CIRCUIT, TTL/SSI: Quad 2-input OR Gates | 04713 | MC3003P | 025767 | 1 |
| | U26 | INTEGRATED CIRCUIT, TTL/SSI: Quad 2-input NAND Gates | 01295 | SN7400N | 019705 | 1 |
| | U27 | INTEGRATED CIRCUIT, TTL/SSI: Dual 1-shot Multi | 01295 | SN74123N | 045209 | 1 |
| | U28 | INTEGRATED CIRCUIT, TTL/MSI: BCD-Decimal Decoder | 01295 | SN7442N | 025749 | 1 |
| | U29 | RESISTOR, MODULE, 12 K, 20% .1 w COMP CARBON | 52542 | 045008 | 045008 | 3 |
| | U30 | Same as U29 | | | | |
| | U31 | Same as U29 | | | | |
| | | EXTRACTOR, HOT STAMP A8 | 52542 | 03984208 | 039842C8 | 1 |
| | | EXTRACTOR, 1/16 MAT | 51495 | 1743 | 100865 | 2 |
| | | ROLL PIN | 73957 | 50-0940250 | 100752 | 2 |
| | W1 | MOLDED JUMPER | GETTIG | L-2007-1 | 102879 | 2 |
| | W2 | NOT USED | | | | |
| | W3 | NOT USED | | | | |
| | W4 | NOT USED | | | | |
| | W5 | NOT USED | | | | |
| | W6 | Same as W1 | | | | |
| | | Opt 10/11 Serial Program Assembly #2 #05371701 | | | | |
| | C1 | CAPACITOR, TANT 39 µf, 10 V 10% | 56289 | 150D396X9010B2 | 100183 | 1 |
| | C2 | CAPACITOR, DISC CERAMIC: .05 µf 10 V +80-20% | 71590 | UK10-503 | 100122 | 4 |
| | C3 | Same as C2 | | | | |
| | C4 | Same as C2 | | | | |
| | C5 | Same as C2 | | | | |
| | U1 | INTEGRATED CIRCUIT, TTL/SSI: 4 3-state BUS BFR | 01295 | SN74126N | 045298 | 12 |
| | U2 | Same as U1 | | | | |
| | U3 | Same as U1 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Opt 10/11 Serial Program Assembly #2 #05371701 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | U4 | Same as U1 | | | | |
| | U5 | Same as U1 | | | | |
| | U6 | Same as U1 | | | | |
| | U7 | Same as U1 | | | | |
| | U8 | Same as U1 | | | | |
| | U9 | Same as U1 | | | | |
| | U10 | Same as U1 | | | | |
| | U11 | INTEGRATED CIRCUIT, TTL/SSI Hex Inverter | 01295 | SN7404N | 025779 | 2 |
| | U12 | INTEGRATED CIRCUIT, TTL/SSI Quad 2-input OR Gates | 04713 | MC3003P | 025767 | 1 |
| | U13 | Same as U1 | | | | |
| | U14 | Same as U1 | | | | |
| | U15 | Same as U11 | | | | |
| | U16 | INTEGRATED CIRCUIT, TTL/MSI Dual 2-4 line Decoder | 01295 | SN74LS139N | 045299 | 2 |
| | U17 | Same as U16 | | | | |
| | U18 | INTEGRATED CIRCUIT, TTL/SSI Quad 2-input AND GATE | 04713 | MC3001P | 025740 | 1 |
| | U19 | INTEGRATED CIRCUIT, TTL/MSI Binary Cntr Par Set | 18324 | N8281A | 025727 | 4 |
| | U20 | Same as U19 | | | | |
| | U21 | Same as U19 | | | | |
| | U22 | Same as U19 | | | | |
| | | EXTRACTOR, HOT STAMP A9 | 52542 | 03984209 | 03984209 | 1 |
| | | EXTRACTOR, 1/16 MAT | 51495 | 1743 | 100865 | 2 |
| | | ROLL PIN | 73957 | 50-0940250 | 100752 | 2 |

# REMOTE PARALLEL PROGRAMMING
# OPTIONS 12 and 14
# SCHEMATIC #7-05371801

## 1.1 INTRODUCTION

Remote parallel programming is available for systems using either positive true (+5V) or ground true inputs. The circuitry operates in the same manner for either input. The placement of a jumper wire between A and B or B and C determines the positive true or ground true operation. Delay time data and trigger source data are entered from the remote location. Other functions can be controlled locally. Table Opt 12/14.1 shows the pin input functions for the external input connector.

## 1.2 CIRCUIT DESCRIPTION

Control for remote operation is entered through J13-49 and is routed directly to the control assembly, A16. In the control assembly, the signal inhibits the thumbwheel switch strobe gate and is routed back to all parallel channel program boards to enable the trigger source select gates U15, U17, and disable the thumbwheel switch common circuits though U17-13. Gates U3 through U11 are for data entry. These gates are strobed by the output fo A16U6, control assembly, via the parallel common connections. As each set of data lines is strobed, the information is routed through exclusive OR gates U12 and output gates U13 to the applicable storage register in the channel assembly.

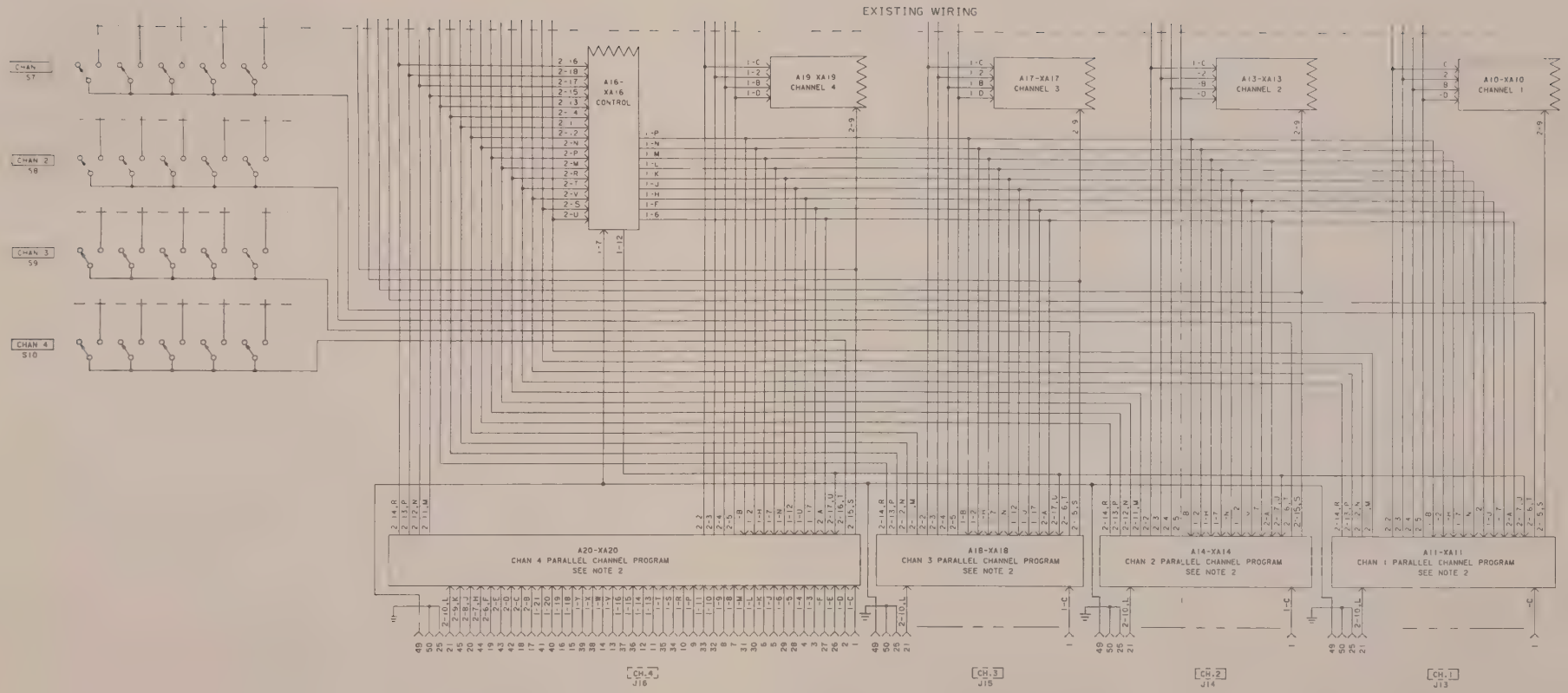
Trigger source selection is entered through exclusive OR gates U14, U16 and routed through output gates U15, U17 to the trigger source enabling gate in the control assembly.

TABLE OPT 12/14.1 REMOTE CONNECTOR PIN FUNCTIONS

| Pin # | BCD | Function | Pin # | BCD | Function |
|---|---|---|---|---|---|
| 1 | 1 | | 5 | 1 | |
| 2 | 2 | Data Input | 6 | 2 | Data Input |
| 26 | 4 | 10 ns | 30 | 4 | 1 µs |
| 27 | 8 | | 31 | 8 | |
| 3 | 1 | | 7 | 1 | |
| 4 | 2 | Data Input | 8 | 2 | Data Input |
| 28 | 4 | 100 ns | 32 | 4 | 10 µs |
| 29 | 8 | | 33 | 8 | |

TABLE OPT 12/14.1 - REMOTE CONNECTOR PIN FUNCTIONS (Cont'd)

| Pin # | BCD | Function | Pin # | BCD | Function |
|---|---|---|---|---|---|
| 9 | 1 | | 15 | 1 | |
| 10 | 2 | Data Input | 16 | 2 | Data Input |
| 34 | 4 | 100 µs | 40 | 4 | 100 ms |
| 35 | 8 | | 41 | 8 | |
| 11 | 1 | | 17 | 1 | |
| 12 | 2 | Data Input | 18 | 2 | Data Input |
| 36 | 4 | 1 ms | 42 | 4 | 1s |
| 37 | 8 | | 43 | 8 | (OPT 05 ONLY) |
| 13 | 1 | | 19 | | TØ |
| 14 | 2 | Data Input | 20 | | T2 |
| 38 | 4 | 10 ms | 21 | | RECYCLE |
| 39 | 8 | | 44 | | T1 |
| | | | 45 | | T3 |
| 25, 50 | | Ground | 49 | | Control |


EXISTING WIRING
CHAN 1 S7
CHAN 2 S8
CHAN 3 S9
CHAN 4 S10
A16-XA16 CONTROL
A19 XA19 CHANNEL 4
A17-XA17 CHANNEL 3
A13-XA13 CHANNEL 2
A10-XA10 CHANNEL 1
A20-XA20 CHAN 4 PARALLEL CHANNEL PROGRAM SEE NOTE 2
A18-XA18 CHAN 3 PARALLEL CHANNEL PROGRAM SEE NOTE 2
A14-XA14 CHAN 2 PARALLEL CHANNEL PROGRAM SEE NOTE 2
A11-XA11 CHAN 1 PARALLEL CHANNEL PROGRAM SEE NOTE 2
CH.4 J16
CH.3 J15
CH.2 J14
CH.1 J13

3. WIRING SHOWN FOR J16 IS TYPICAL FOR J13, J14, AND J15

2.

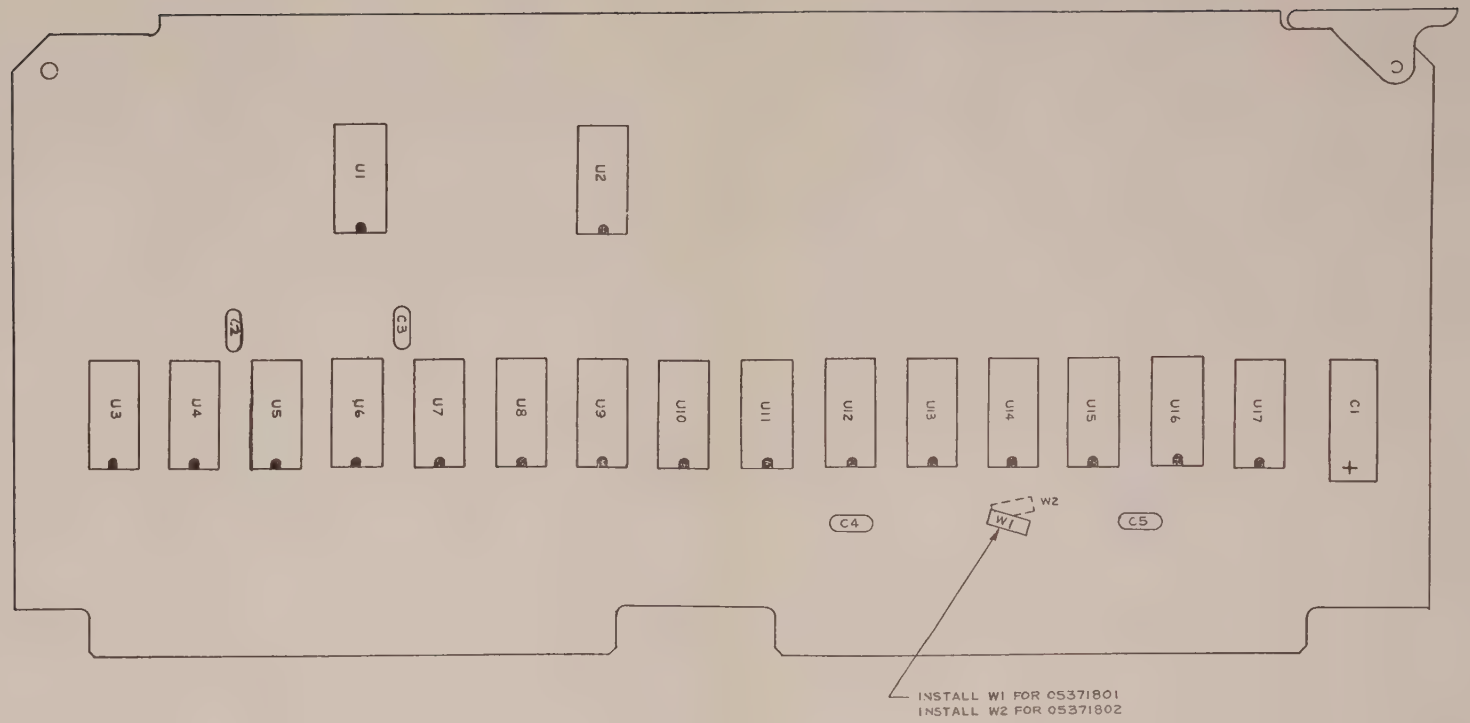
| OPTION | SCHEMATIC | ASSEMBLY |
|---|---|---|
| 12 | 7-05371801 | 05371801 |
| 14 | 7-05371801 | 05371802 |

1. ON A11, A14, A18, AND A20 +5V IS CONNECTED TO PINS 2-21, Y AND GND IS CONNECTED TO PINS 1-1, A AND 2-22, Z

NOTES: UNLESS OTHERWISE SPECIFIED

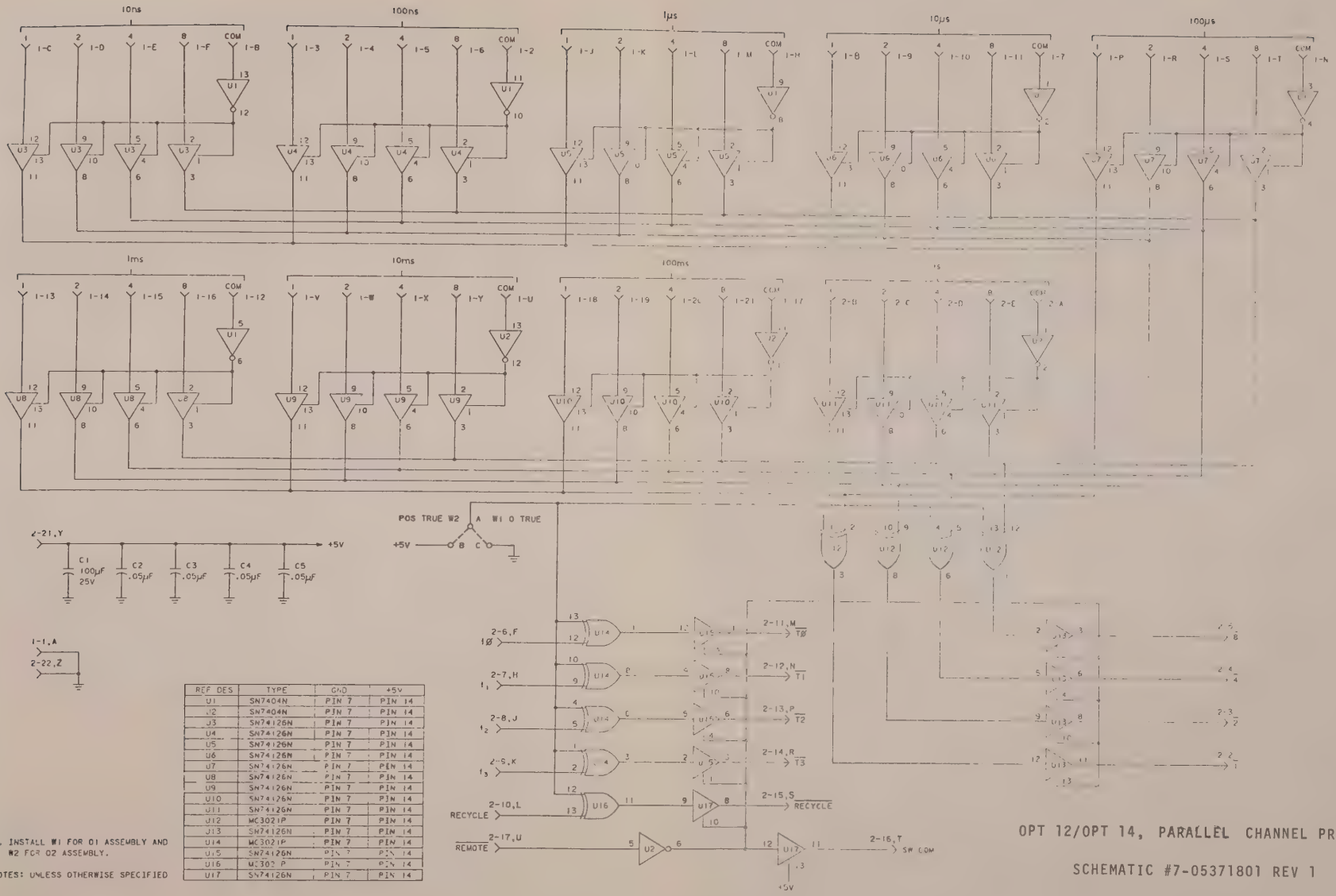
OPT 12/OPT 14, PARALLEL CHANNEL

WIRING SCHEMATIC #7-053822 REV 1




OPT 12/OPT 14, PARALLEL CHANNEL

PROGRAM ASSEMBLY #05371801 REV 1




| REF DES | TYPE | GND | +5V |
|---|---|---|---|
| U1 | SN7404N | PIN 7 | PIN 14 |
| U2 | SN7404N | PIN 7 | PIN 14 |
| U3 | SN74126N | PIN 7 | PIN 14 |
| U4 | SN74126N | PIN 7 | PIN 14 |
| U5 | SN74126N | PIN 7 | PIN 14 |
| U6 | SN74126N | PIN 7 | PIN 14 |
| U7 | SN74126N | PIN 7 | PIN 14 |
| U8 | SN74126N | PIN 7 | PIN 14 |
| U9 | SN74126N | PIN 7 | PIN 14 |
| U10 | SN74126N | PIN 7 | PIN 14 |
| U11 | SN74126N | PIN 7 | PIN 14 |
| U12 | MC3021P | PIN 7 | PIN 14 |
| U13 | SN74126N | PIN 7 | PIN 14 |
| U14 | MC3021P | PIN 7 | PIN 14 |
| U15 | SN74126N | PIN 7 | PIN 14 |
| U16 | MC3021P | PIN 7 | PIN 14 |
| U17 | SN74126N | PIN 7 | PIN 14 |

1. INSTALL W1 FOR 01 ASSEMBLY AND W2 FOR 02 ASSEMBLY.

NOTES: UNLESS OTHERWISE SPECIFIED

OPT 12/OPT 14, PARALLEL CHANNEL PROGRAM

SCHEMATIC #7-05371801 REV 1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Opt 12, Final Assembly #05382204

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | A11 | ASSEMBLY, PARALLEL CHANNEL PROGRAM | 52542 | 05371801 | 05371801 | 4 |
| | A14 | Same as A11 | | | | |
| | A18 | Same as A11 | | | | |
| | A20 | Same as A11 | | | | |
| | XA11 | CONNECTOR, 22 POSITION Dual Lug | 71785 | 251-22-30-161 | 101167 | 8 |
| | XA14 | Same as XA11 | | | | |
| | XA18 | Same as XA11 | | | | |
| | XA20 | Same as XA11 | | | | |
| | | SCREW, PAN HEAD MACHINE: 4-40 x 1/2 | MIL | MS51957-17 | 10062608 | 16 |
| | | WASHER: #4 flat | MIL | MS15795-803 | 100703 | 16 |
| | | NUT: #4-40 kep | 78189 | 511-041800-00 | 100941 | 16 |
| | | CARD GUIDE | 52542 | 053666 | 053666 | 8 |
| | | EXTRACTOR, HOT STAMPED A11 | 52542 | 03984211 | 03984211 | 1 |
| | | EXTRACTOR, 1/16 MAT | 51495 | 1743 | 100865 | 4 |
| | | EXTRACTOR, HOT STAMPED A14 | 52542 | 03984214 | 03984214 | 1 |
| | | EXTRACTOR, HOT STAMPED A18 | 52542 | 03984281 | 03984231 | 1 |
| | | EXTRACTOR, HOT STAMPED A20 | 52542 | 03984220 | 03984220 | 1 |
| | | ROLL PIN | 73957 | 50-0940250 | 100752 | 4 |
| | | Opt 14, Final Assembly #05382404 | | | | |
| | A11 | ASSEMBLY, PARALLEL CHANNEL PROGRAM | 52542 | 05371802 | 05371802 | 4 |
| | A14 | Same as A11 | | | | |
| | A18 | Same as A11 | | | | |
| | A20 | Same as A11 | | | | |
| | XA11 | CONNECTOR, 22 POSITION Dual Lug | 71785 | 251-22-30-161 | 101167 | 8 |
| | XA14 | Same as XA11 | | | | |
| | XA18 | Same as XA11 | | | | |
| | XA20 | Same as XA11 | | | | |
| | | SCREW, PAN HEAD MACHINE: 4-40 x 1/2 | MIL | MS51957-17 | 10062608 | 16 |
| | | WASHER: #4 flat | MIL | MS15795-803 | 100703 | 16 |
| | | NUT: #4-40 kep | 78189 | 511-041800-00 | 100941 | 16 |
| | | CARD GUIDE | 52542 | 053666 | 053666 | 8 |
| | | EXTRACTOR, HOT STAMPED A11 | 52542 | 03984211 | 03984211 | 1 |
| | | EXTRACTOR, 1/16 MAT | 51495 | 1743 | 100865 | 4 |
| | | EXTRACTOR, HOT STAMPED A14 | 52542 | 03984214 | 03984214 | 1 |
| | | EXTRACTOR, HOT STAMPED A18 | 52542 | 03984281 | 03984231 | 1 |
| | | EXTRACTOR, HOT STAMPED A20 | 52542 | 03984220 | 03984220 | 1 |
| | | ROLL PIN | 73957 | 50-0940250 | 100752 | 4 |
| | | Opt 12/14 Parallel Channel Program Assembly #05371801 | | | | |
| | C1 | CAPACITOR, EL AX 100 µf, 25 V +75-10% | 56289 | TE1211 | 101165 | 1 |
| | C2 | CAPACITOR, DISC CERAMIC .05 µf, 10 V +80-20% | 71590 | UK10-503 | 100122 | 4 |
| | C3 | Same as C2 | | | | |
| | C4 | Same as C2 | | | | |
| | C5 | Same as C2 | | | | |

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Opt 12/14 Parallel Channel Program Assembly #05371801 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | U1 | INTEGRATED CIRCUIT, TTL/SSI: Hex Inverter | 01295 | SN7404N | 025779 | 2 |
| | U2 | Same as U1 | | | | |
| | U3 | INTEGRATED CIRCUIT, TTL/SSI: 4 3-state BUS BFR | 01295 | SN74126N | 045298 | 12 |
| | U4 | Same as U3 | | | | |
| | U5 | Same as U3 | | | | |
| | U6 | Same as U3 | | | | |
| | U7 | Same as U3 | | | | |
| | U8 | Same as U3 | | | | |
| | U9 | Same as U3 | | | | |
| | U10 | Same as U3 | | | | |
| | U11 | Same as U3 | | | | |
| | U12 | INTEGRATED CIRCUIT, TTL/SSI: Quad 2-input Exclusive OR Gate | 04713 | MC3021P | 025789 | 3 |
| | U13 | Same as U3 | | | | |
| | U14 | Same as U12 | | | | |
| | U15 | Same as U3 | | | | |
| | U16 | Same as U12 | | | | |
| | U17 | Same as U3 | | | | |
| | W1 | JUMPER, MOLDED | GETTIG | L-2007-1 | 102879 | 1 |
| | W2 | NOT USED | | | | |
| | | EXTRACTOR, 1/16 MAT | 51495 | 1743 | 100865 | 1 |
| | | ROLL PIN | 73957 | 50-0940250 | 100752 | 1 |

# MANUAL CONTROL
# OPTION 13
# ASSEMBLY #05382308

## 1.1 INTRODUCTION

Option 13 removes manual control of all time parameters from the front panel. The power switch is the only control left on the front panel and all time data selection is made from the remote station.

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Opt 13, Front Panel Assembly #05382308

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/S |
|---|---|---|---|---|---|---|
| | | DELETE | | | | |
| | | ASSEMBLY, FRONT PANEL | 52542 | 05366008 | 05366008 | 1 |
| | | ADD | | | | |
| | | FRONT SUB PANEL | 52542 | 053660 | 053660 | 1 |
| | | DECORATIVE PANEL | 52542 | 05366212 | 05366212 | 1 |
| | S1 | SWITCH, TOGGLE SPDT BLK BAT W/NUT | 09353 | 7101PN+Dressnut | 102346 | 1 |
| | DS1 | DIODE, LED W/PANEL CLIP | 28480 | 5082-4440 | 100456 | 1 |

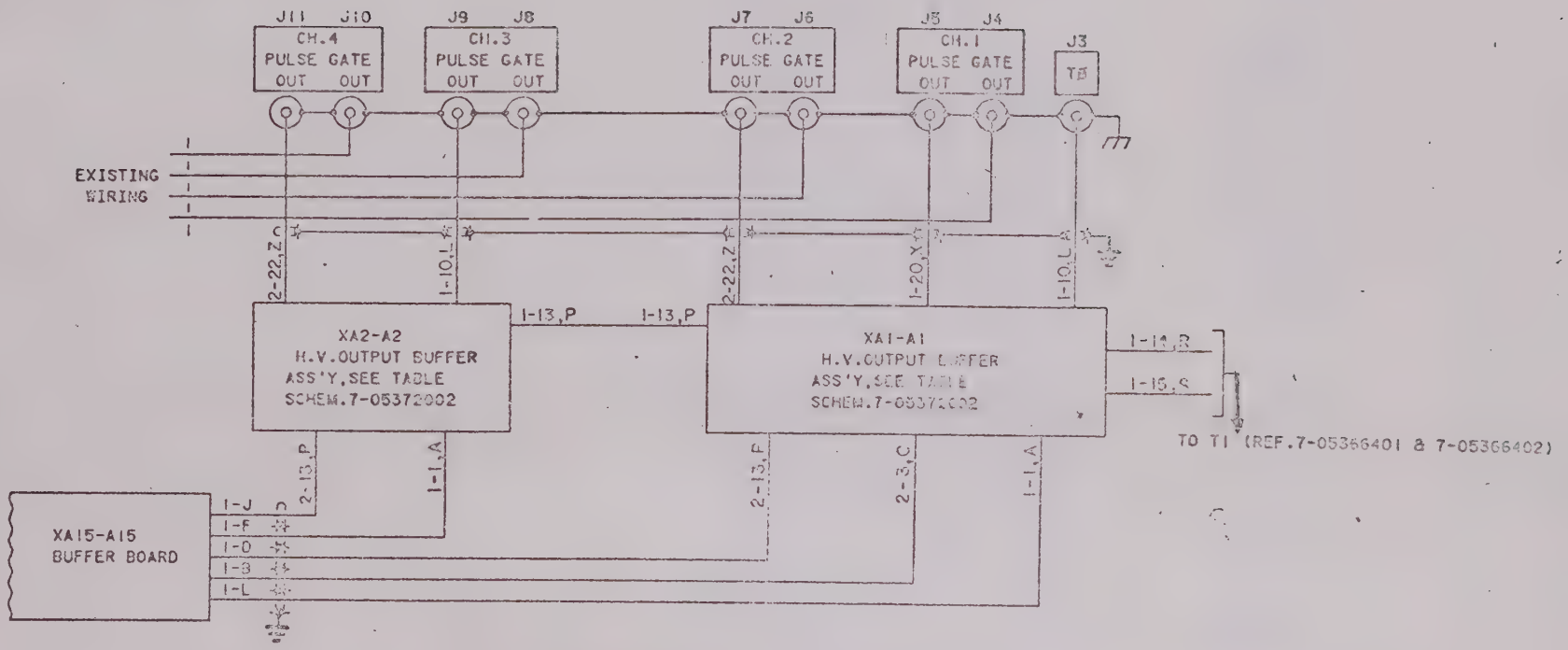
# HIGH VOLTAGE BUFFERS
# OPTION 21
# SCHEMATIC #7-05372002

## 1.1 INTRODUCTION

The high voltage output buffers convert the timed pulse output and TØ pulse output from the +2 Vdc level to approximately +80 Vdc. This option is available either with or without the safety option 91. With Option 21 installed, the recycle rate is reduced and the output pulse rise time is increased.

## 1.2 CIRCUIT DESCRIPTION

The high voltage buffer circuit consists of a power supply and buffer amplifiers with a transformer coupled output. The bridge rectifier is connected to a secondary winding of the T1 transformer in the power supply. +60 Vdc is available through pass transistor Q1. Since all the buffer circuits operate identically, only one will be described. The positive pulse from the buffer assembly turns Q2 on. The low from Q2 turns Q3 on, which turns on Q4/Q5, Q6/Q7, Q8/Q9, and Q10/Q11. These four circuits are paralleled, with input through the primary winding of T1. The output of the secondary, in phase with the primary, is a positive pulse from +75 Vdc to +100 Vdc. With Option 91 installed, output is through relay contact 10, 9. When Option 91 is not installed, jumper wire W1 furnishes the output path. Output gate length is determined by the time constants of R9/C4, R13/C5, R15/C6, and R18/C7.

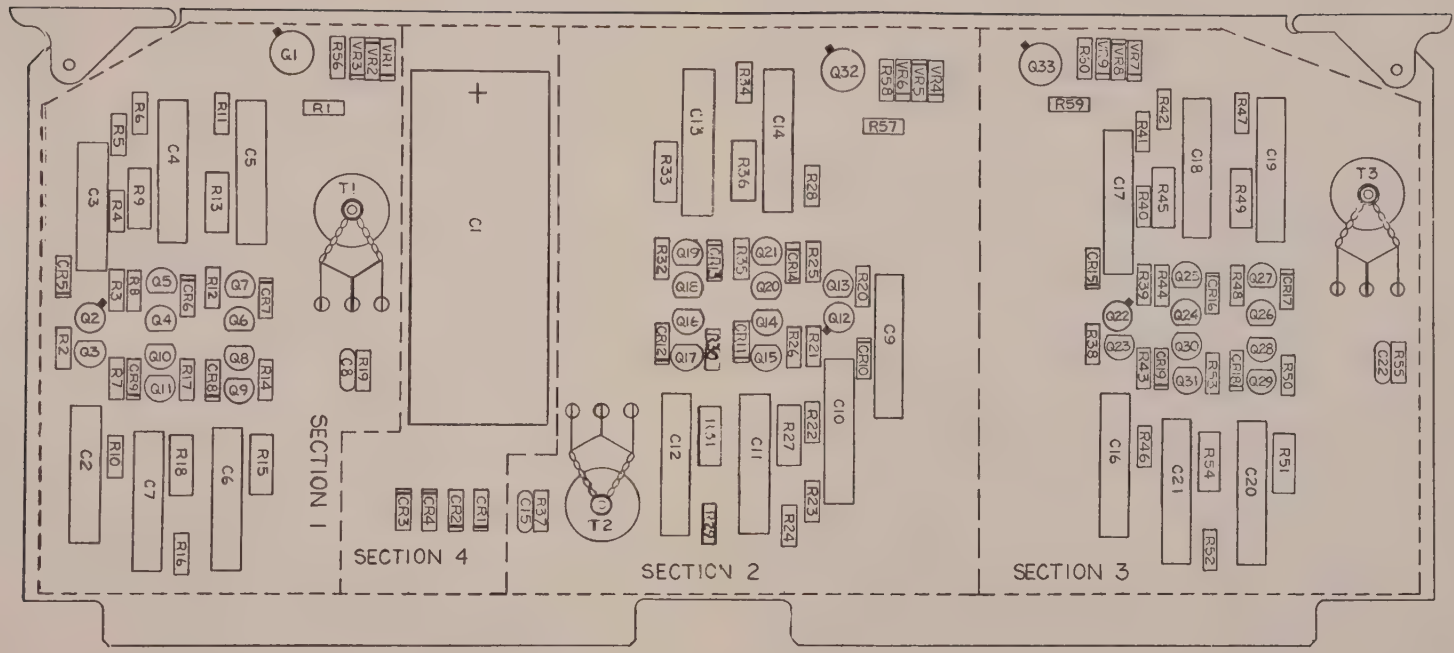



1. ON A1 & A2 GND IS CONNECTED TO 1-1,A,7,H, 18,V; 2-5,E,7,H,9,K,11,M,22,& Z.

NOTES: UNLESS OTHERWISE SPECIFIED

| | XA1-A1 | XA2-A2 |
|---|---|---|
| 604 OPT.21 | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | [illegible] |
| 603 OPT.21 W/91 | 05372002 | 05372002 |
| 604 OPT.21 | 05372002 | 05372004 |
| 604 OPT.21 W/91 | 05372002 | 05372004 |

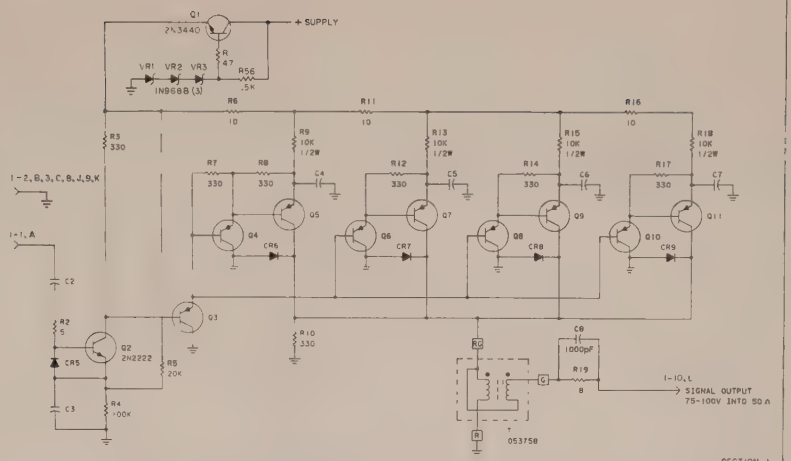
OPT 21, HIGH VOLTAGE WIRING SCHEMATIC

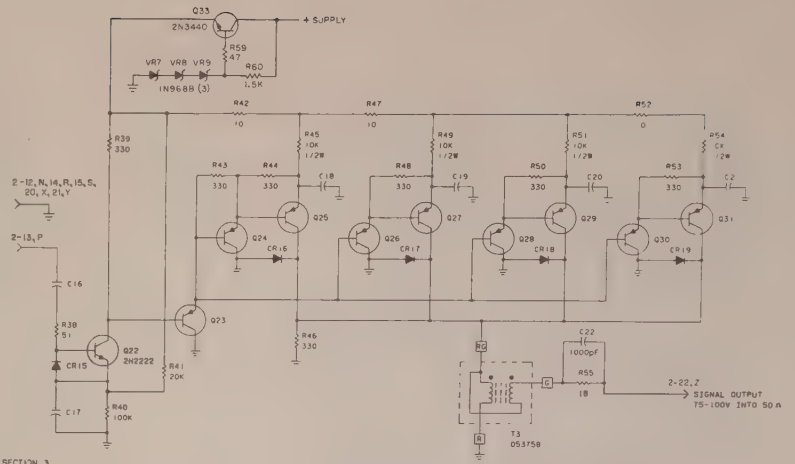


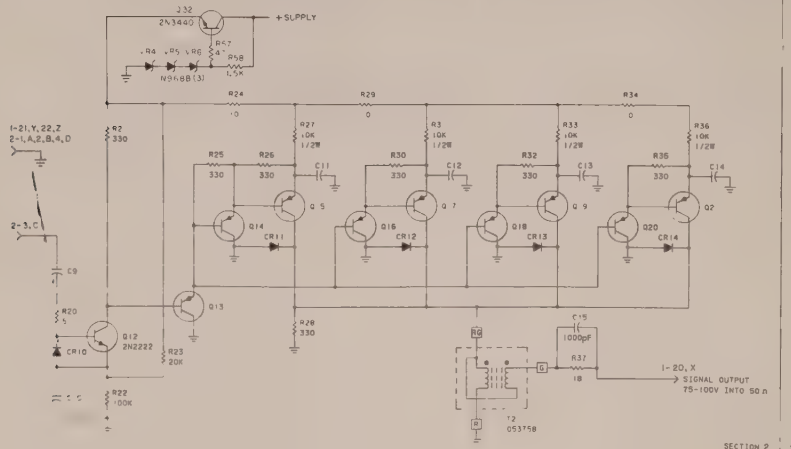

| BOARD TABULATION | |
|---|---|
| VARIATION | COMPONENTS INSTALL |
| 05372001 | SECTIONS 1, 2 & 4 |
| 05372002 | SECTIONS 1, 2, 3 & 4 |
| 05372003 | SECTION 1 |
| 05372004 | SECTIONS 1 & 3 |

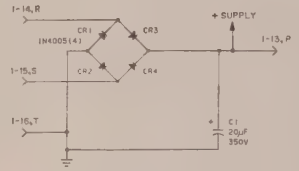
OPT 21, HIGH VOLTAGE BUFFER

ASSEMBLY #05372002 REV 2




| BOARD CONFIGURATION | |
|---|---|
| VARIATION | COMPONENTS INSTALLED |
| 05372001 | SECTIONS 1,2,3,4 |
| 05372002 | SECTIONS 1,2,3,4 |
| 05372003 | SECTION 1 |
| 05372004 | SECTIONS 1,3,3 |

5. BOXED LETTERS INDICATE SPECIFIC LABELED POINTS ON BOARD.

4. DIODES ARE 1N415

3. TRANSISTORS ARE MPS-L51

2. CAPACITORS ARE 1.0 μF, 100V, ±20%

1. RESISTORS ARE IN OHMS, 1/4W, ±5%

NOTE: UNLESS OTHERWISE SPECIFIED

OPT 21, HIGH VOLTAGE BUFFER

SCHEMATIC #7-05372002 REV 2

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Opt 21, High Voltage Buffer Final Assembly #05382504

| (1) DESIGNATOR ITEM | REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/S |
|---|---|---|---|---|---|---|
| | A1 | ASSEMBLY, HIGH VOLTAGE BUFFER P.C. BOARD | 52542 | 05372002 | 05372002 | 1 |
| | A2 | ASSEMBLY, HIGH VOLTAGE BUFFER P.C. BOARD | 52542 | 05372004 | 05372004 | 1 |
| | XA1 | CONNECTOR, 22 POSITION Dual Lug | 71785 | 251-22-30-161 | 101167 | 4 |
| | XA2 | Same as XA1 | | | | |
| | | SCREW, PAN HEAD MACHINE: 4-40 x 1/2 | MIL | MS51957-17 | 10062608 | 8 |
| | | WASHER, #4 flat | MIL | MS15795-803 | 100703 | 8 |
| | | NUT: #4-40 kep | 78189 | 511-041800-00 | 100941 | 8 |
| | | CARD GUIDE | 52542 | 053666 | 053666 | 4 |
| | | Opt 21 w/Opt 91 Final Assembly #05382508 | | | | |
| | A1 | ASSEMBLY, HIGH VOLTAGE BUFFER P.C. BOARD | 52542 | 05372006 | 05372006 | 1 |
| | A2 | ASSEMBLY, HIGH VOLTAGE BUFFER P.C. BOARD | 52542 | 05372008 | 05372008 | 1 |
| | XA1 | CONNECTOR, 22 POSITION Dual Lug | 71785 | 251-22-30-161 | 101167 | 4 |
| | XA2 | Same as XA1 | | | | |
| | | SCREW, PAN HEAD MACHINE: 4-40 x 1/2 | MIL | MS51957-17 | 10062608 | 8 |
| | | WASHER, #4 flat | MIL | MS15795-803 | 100703 | 8 |
| | | NUT: #4-40 kep | 78189 | 511-041800-00 | 100941 | 8 |
| | | CARD GUIDE | 52542 | 053666 | 053666 | 4 |
| | | Opt 21 High Voltage Buffer Assembly #05372002 | | | | |
| | C1 | NOT USED | | | | |
| | C2 | CAPACITOR, METMYL: 1.0 µf 100 V 20% | 14752 | 210B1B105 | 100056 | 12 |
| | C3 | Same as C2 | | | | |
| | C4 | Same as C2 | | | | |
| | C5 | Same as C2 | | | | |
| | C6 | Same as C2 | | | | |
| | C7 | Same as C2 | | | | |
| | C8 | CAPACITOR, DISC MICA: 1000 pF 100 V 5% crimp lead | 72136 | DM15FA102J0 | 10024301 | 2 |
| | C9 | NOT USED | | | | |
| | C10 | NOT USED | | | | |
| | C11 | NOT USED | | | | |
| | C12 | NOT USED | | | | |
| | C13 | NOT USED | | | | |
| | C14 | NOT USED | | | | |
| | C15 | NOT USED | | | | |
| | C16 | Same as C2 | | | | |
| | C17 | Same as C2 | | | | |
| | C18 | Same as C2 | | | | |
| | C19 | Same as C2 | | | | |
| | C20 | Same as C2 | | | | |
| | C21 | Same as C2 | | | | |
| | C22 | Same as C8 | | | | |
| | CR1 | NOT USED | | | | |
| | CR2 | NOT USED | | | | |
| | CR3 | NOT USED | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Opt 21, High Voltage Buffer Assembly #05372002 (Cont'd)

| (1) DESIGNATOR ITEM | REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/C |
|---|---|---|---|---|---|---|
| | CR4 | NOT USED | | | | |
| | CR5 | DIODE, SIGNAL: 50 V | 03508 | IN4151 | 100385 | 10 |
| | CR6 | Same as CR5 | | | | |
| | CR7 | Same as CR5 | | | | |
| | CR8 | Same as CR5 | | | | |
| | CR9 | Same as CR5 | | | | |
| | CR10 | NOT USED | | | | |
| | CR11 | NOT USED | | | | |
| | CR12 | NOT USED | | | | |
| | CR13 | NOT USED | | | | |
| | CR14 | NOT USED | | | | |
| | CR15 | Same as CR5 | | | | |
| | CR16 | Same as CR5 | | | | |
| | CR17 | Same as CR5 | | | | |
| | CR18 | Same as CR5 | | | | |
| | CR19 | Same as CR5 | | | | |
| | Q1 | TRANSISTOR, SILICON NPN | 02735 | 2N3440 | 101420 | 2 |
| | Q2 | TRANSISTOR, SILICON NPN | 04713 | 2N222 | 101347 | 2 |
| | Q3 | TRANSISTOR, SILICON NPN | 04713 | MPS-L51 | 103108 | 18 |
| | Q4 | Same as Q3 | | | | |
| | Q5 | Same as Q3 | | | | |
| | Q6 | Same as Q3 | | | | |
| | Q7 | Same as Q3 | | | | |
| | Q8 | Same as Q3 | | | | |
| | Q9 | Same as Q3 | | | | |
| | Q10 | Same as Q3 | | | | |
| | Q11 | Same as Q3 | | | | |
| | Q12 | NOT USED | | | | |
| | Q13 | NOT USED | | | | |
| | Q14 | NOT USED | | | | |
| | Q15 | NOT USED | | | | |
| | Q16 | NOT USED | | | | |
| | Q17 | NOT USED | | | | |
| | Q18 | NOT USED | | | | |
| | Q19 | NOT USED | | | | |
| | Q20 | NOT USED | | | | |
| | Q21 | NOT USED | | | | |
| | Q22 | Same as Q2 | | | | |
| | Q23 | Same as Q3 | | | | |
| | Q24 | Same as Q3 | | | | |
| | Q25 | Same as Q3 | | | | |
| | Q26 | Same as Q3 | | | | |
| | Q27 | Same as Q3 | | | | |
| | Q28 | Same as Q3 | | | | |
| | Q29 | Same as Q3 | | | | |
| | Q30 | Same as Q3 | | | | |
| | Q31 | Same as Q3 | | | | |
| | Q32 | NOT USED | | | | |
| | Q33 | Same as Q1 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Cpt 21, High Voltage Buffer Assembly #05372002 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | R1 | RESISTOR, COMP: 47 Ω, 5% 1/4w | 01121 | CB4705 | 101560 | 2 |
| | R2 | RESISTOR, COMP: 51 Ω, 5% 1/4w | 01121 | CB5105 | 101672 | 2 |
| | R3 | RESISTOR, COMP: 330Ω, 5% 1/4w | 01121 | CB3315 | 101536 | 14 |
| | R4 | RESISTOR, COMP: 100 K, 5% 1/4w | 01121 | CV1045 | 101558 | 2 |
| | R5 | RESISTOR, COMP: 20 K, 5% 1/4w | 01121 | CB2035 | 101607 | 2 |
| | R6 | RESISTOR, COMP: 10 Ω, 5% 1/4w | 01121 | CB1005 | 101557 | 6 |
| | R7 | Same as R3 | | | | |
| | R8 | Same as R3 | | | | |
| | R9 | RESISTOR, COMP: 10 K, 5% 1/2w | 01121 | EB1035 | 10-471 | 8 |
| | R10 | Same as R3 | | | | |
| | R11 | Same as R6 | | | | |
| | R12 | Same as R3 | | | | |
| | R13 | Same as R9 | | | | |
| | R14 | Same as R3 | | | | |
| | R15 | Same as R9 | | | | |
| | R16 | Same as R6 | | | | |
| | R17 | Same as R3 | | | | |
| | R18 | Same as R9 | | | | |
| | R19 | RESISTOR, COMP: 18 Ω 5% 1/4w | 01121 | CB1805 | 101727 | 2 |
| | R20 | NOT USED | | | | |
| | R21 | NOT USED | | | | |
| | R22 | NOT USED | | | | |
| | R23 | NOT USED | | | | |
| | R24 | NOT USED | | | | |
| | R25 | NOT USED | | | | |
| | R26 | NOT USED | | | | |
| | R27 | NOT USED | | | | |
| | R28 | NOT USED | | | | |
| | R29 | NOT USED | | | | |
| | R30 | NOT USED | | | | |
| | R31 | NOT USED | | | | |
| | R32 | NOT USED | | | | |
| | R33 | NOT USED | | | | |
| | R34 | NOT USED | | | | |
| | R35 | NOT USED | | | | |
| | R36 | NOT USED | | | | |
| | R37 | NOT USED | | | | |
| | R38 | Same as R2 | | | | |
| | R39 | Same as R3 | | | | |
| | R40 | Same as R4 | | | | |
| | R41 | Same as R5 | | | | |
| | R42 | Same as R6 | | | | |
| | R43 | Same as R3 | | | | |
| | R44 | Same as R3 | | | | |
| | R45 | Same as R9 | | | | |
| | R46 | Same as R3 | | | | |
| | R47 | Same as R6 | | | | |
| | R48 | Same as R3 | | | | |
| | R49 | Same as R9 | | | | |
| | R50 | Same as R3 | | | | |

EQUIPMENT/ASSEMBLY DESIGNATION Opt 21: High Voltage Buffer Assembly #05272022 (Cont'd)

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | R51 | Same as R9 | | | | |
| | R52 | Same as R6 | | | | |
| | R53 | Same as R3 | | | | |
| | R54 | Same as R9 | | | | |
| | R55 | Same as R19 | | | | |
| | R56 | RESISTOR, COMP: 1.5 K, 5% 1/4w | 01121 | CB1525 | 101577 | 2 |
| | R57 | NOT USED | | | | |
| | R58 | NOT USED | | | | |
| | R59 | Same as R1 | | | | |
| | R60 | Same as R56 | | | | |
| | VR1 | DIODE, ZENER: 20 V .4w 5% | 04713 | IN968B | 100409 | 6 |
| | VR2 | Same as VR1 | | | | |
| | VR3 | Same as VR1 | | | | |
| | VR4 | NOT USED | | | | |
| | VR5 | NOT USED | | | | |
| | VR6 | NOT USED | | | | |
| | VR7 | Same as VR1, | | | | |
| | VR8 | Same as VR1 | | | | |
| | VR9 | Same as VR1 | | | | |
| | T1 | TRANSFORMER, PULSE | 52542 | 053753 | 053753 | 2 |
| | T2 | NOT USED | | | | |
| | T3 | Same as T1 | | | | |
| | | EXTRACTOR, 1/16 MAT | 51495 | 1743 | 100865 | 2 |
| | | EXTRACTOR, HOT STAMPED A2 | 52542 | 03984202 | 03984202 | 1 |
| | | ROLL PIN | 73957 | 50-0940250 | 100752 | 2 |
| | | SCREW, PAN HEAD MACHINE: 4-40 x 9/16 | 08547 | BY DESCRIPTION | 100835 | 2 |
| | | WASHER, SHOULDER: Nylon | 16758 | 7274777 | 112580 | 4 |
| | | WASHER, #4 flat | MIL | MS15795-803 | 100703 | 4 |
| | | NUT, #4-40 kep | 78189 | 511-041800-00 | 100941 | 2 |
| | | TERMINAL SWAGE | 88245 | .2000B | 100482 | 6 |

# OUTPUT SAFETY
# OPTION 91
# SCHEMATIC #7-05365808 and #7-05371902

Option 91 consists of an ignition type keylock which controls output relays in the buffer assembly. Until operated by the proper key, all outputs are grounded. This safety feature is especially valuable for use in conjunction with Option 21.

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Opt 91, Final Assembly #05382602

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | DELETE | | | | |
| | A15 | ASSEMBLY, BUFFER P.C. BOARD | 52542 | 05371901 | 05371901 | 1 |
| | | ADD | | | | |
| | | MOD DECORATIVE PANEL | 52542 | 053826 | 053826 | 1 |
| | A15 | ASSEMBLY, BUFFER P.C. BOARD | 52542 | 05371902 | 05371902 | 1 |
| | S50 | SWITCH, KEYLOCK, w/KEY | 81073 | 50CL-45-01-1-2N | 103032 | 1 |

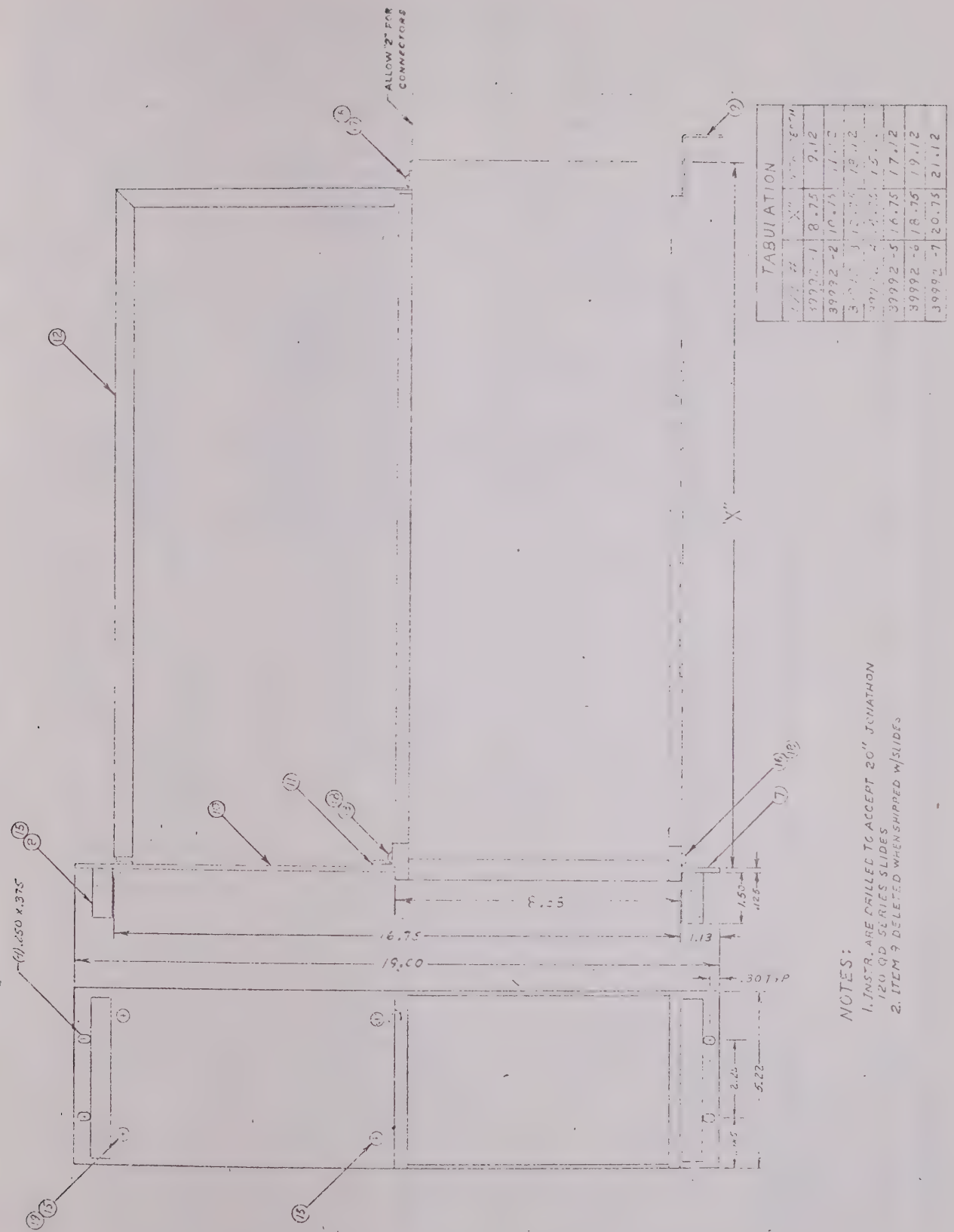
# REAR PANEL OUTPUTS
# OPTION 92

Installation of Option 92 moves the output connectors to the rear panel.

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Opt 92, REAR OUTPUTS #05382704

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | DELETE | | | | |
| | | DECORATIVE PANEL | 52542 | 05366204 | 05366204 | 1 |
| | J2 | CONNECTOR, BNC (FROM FRONT PANEL) | MIL | UG-1094/U | 101155 | 10 |
| | J3 | Same as J2 | | | | |
| | J4 | Same as J2 | | | | |
| | J5 | Same as J2 | | | | |
| | J6 | Same as J2 | | | | |
| | J7 | Same as J2 | | | | |
| | J8 | Same as J2 | | | | |
| | J9 | Same as J2 | | | | |
| | J10 | Same as J2 | | | | |
| | J11 | Same as J2 | | | | |
| | | GND LUG BNC (FROM FRONT PANEL) | 83330 | 1497 | 100495 | 10 |
| | J2 | HOLE PLUG BNC, REAR PANEL | 83330 | 652 | 100840 | 10 |
| | J3 | Same as J2 | | | | |
| | J4 | Same as J2 | | | | |
| | J5 | Same as J2 | | | | |
| | J6 | Same as J2 | | | | |
| | J7 | Same as J2 | | | | |
| | J8 | Same as J2 | | | | |
| | J9 | Same as J2 | | | | |
| | J10 | Same as J2 | | | | |
| | J11 | Same as J2 | | | | |
| | | ADD | | | | |
| | | DECORATIVE PANEL | 52542 | 05366208 | 05366208 | 1 |
| | J2 | CONNECTOR, BNC, REAR PANEL | MIL | UG-1094/U | 101155 | 10 |
| | J3 | Same as J2 | | | | |
| | J4 | Same as J2 | | | | |
| | J5 | Same as J2 | | | | |
| | J6 | Same as J2 | | | | |
| | J7 | Same as J2 | | | | |
| | J8 | Same as J2 | | | | |
| | J9 | Same as J2 | | | | |
| | J10 | Same as J2 | | | | |
| | J11 | Same as J2 | | | | |
| | | GND LUG BNC | 83330 | 1497 | 100495 | 10 |

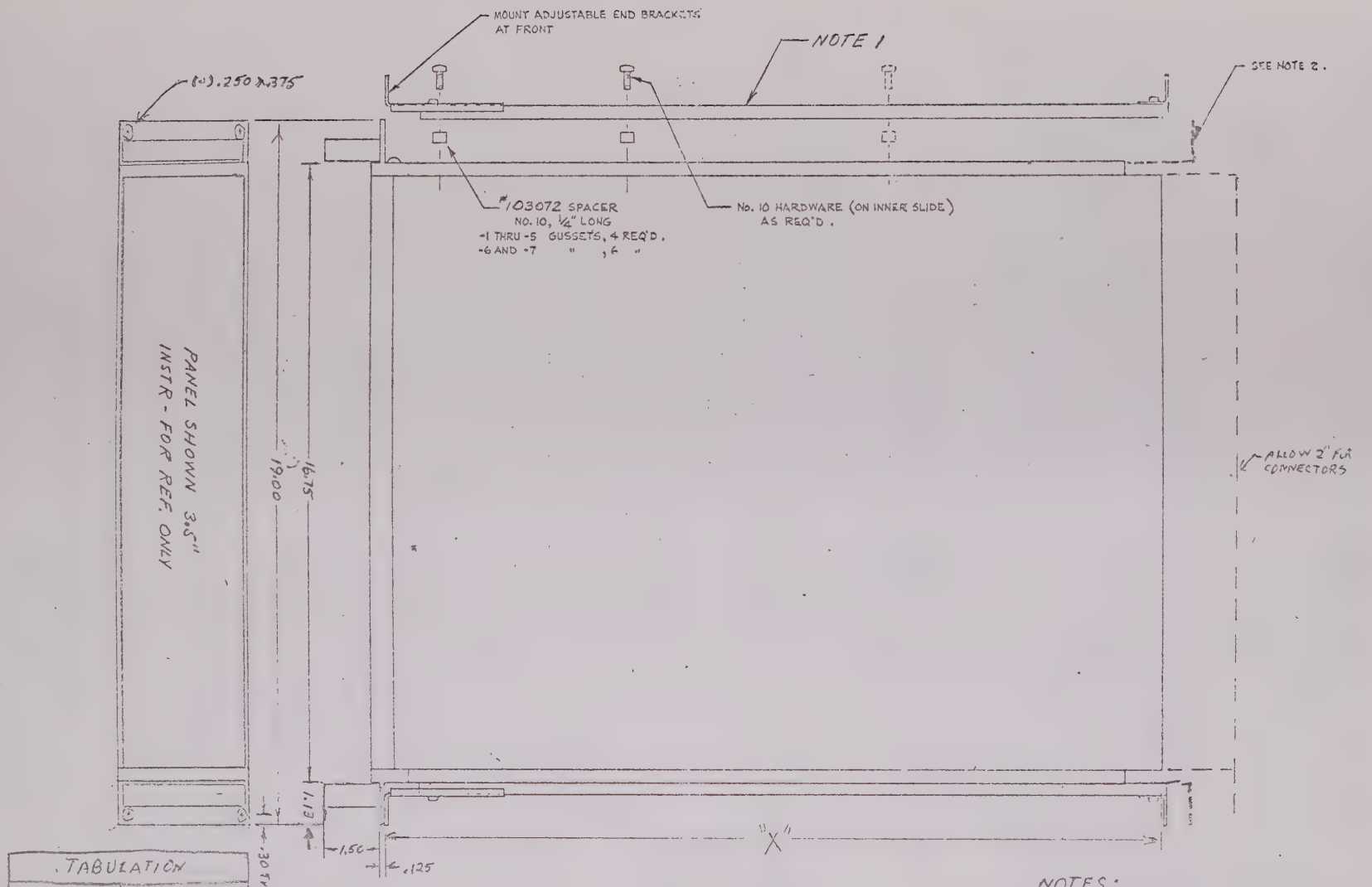



RACK MOUNT ASSEMBLY, TYPE 1011, #039992 REV A

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION Type 1011 Rack Mounting Assembly #039992

| (1) DESIGNATOR ITEM | (1) DESIGNATOR REF | (2) COMPONENT NOMENCLATURE AND DESCRIPTION | (3) MFR'S CODE | (4) MANUFACTURER'S PART NUMBER | (5) SD STOCK NO. | (6) T/Q |
|---|---|---|---|---|---|---|
| | | DELETIONS | | | | |
| | | END TRIM | 52542 | 033674-1 | 033674-1 | 3 |
| | | SIDE COVER | 52542 | 033565-7 | 033565-7 | 2 |
| | | HANDLE | 52542 | 033570-7 | 033570-7 | 2 |
| | | BAIL AND FOOT ASSEMBLY | 52542 | | | 1 |
| | | ADDITIONS | | | | |
| | | END TRIM, RACK MOUNT | 52542 | 039952-3 | 039952-3 | 1 |
| | | HANDLE | 52542 | 100972 | 100972 | 2 |
| | | SUPPORT, REAR | 52542 | 039951-3 | 039951-3 | 1 |
| | | RACK MTG PANEL | 52542 | 039953-3 | 039953-3 | 1 |
| | | RACK MTG PANEL ADAPTER | 52542 | 039954-3 | 039954-3 | 1 |
| | | CHASSIS ADAPTER | 52542 | 039956-7 | 039956-7 | 1 |
| | | SCREW, PAN HEAD MACHINE: 8-32 x 5/8 | MIL | MS51957-46 | 10064210 | 4 |
| | | SCREW, PAN HEAD MACHINE: 8-32 x 3/8 | MIL | MS24693-C50 | 10074308 | 8 |
| | | SCREW, PAN HEAD MACHINE: 8-32 x 5/16 | MIL | MS51957-42 | 10064205 | 2 |
| | | 48 INT TOOTH SHAKE | MIL | MS35333-72 | 100687 | 6 |
| | | NUT, 8-32 kep | 78189 | 511-081800-00 | 100940 | 2 |




| TABULATION | | |
|---|---|---|
| | "X" | INSTR. DEPTH |
| -1 | 8.75 | 9.12 |
| -2 | 10.75 | 11.12 |
| -3 | 12.75 | 13.12 |
| -4 | 14.75 | 15.12 |
| -5 | 16.75 | 17.12 |
| -6 | 18.75 | 19.12 |
| -7 | 20.75 | 21.12 |

NOTES:

1. INSTR. ARE DRILLED TO ACCEPT 20" JONATHON 12000 SERIES SLIDES # 101040
2. DELETE REAR SUPPORTS.

RACK MOUNT ASSEMBLY, TYPE 1012, #045453 REV A

# CHAPTER 9
# SUPPLEMENTAL INFORMATION

## 9.1 INTRODUCTION

This chapter contains revised or updated information reflecting changes in production requirements of this instrument. This information can include changes in assembly/schematic drawings, parts lists, operating instructions, calibration procedures, etc. Changes to parts lists will contain only the added parts, plus a list of deleted items. The supplemental pages for each assembly will be identified with the words SUPPLEMENTAL INFORMATION, followed by the identification of the changed assembly. For example, if the Control Assembly is to be changed, the package identification will read as follows:

MODEL 600B
SUPPLEMENTAL INFORMATION
CONTROL ASSEMBLY
SCHEMATIC #7-05371201

Page identification for an October 19XX change will be:

600B-10-XX SUPPLEMENT; page numbering will be in numerical order.

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